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ABSTRACT

This handbook, designed as part of the Right to Read Program in Hampton, Virginia, focuses on the development of reading skills within the content area classroom. Sections discussing the instructional and organizational strategies are followed by specific units of study. These individual units include learning objectives or concepts, materials, activities, and references. Unit titles are "The Universe," "Meteorology: The Study of Weather," "Water Communities," "Land Communities," "The Three States of Matter," "Energy To Do Work," "A Nation in Conflict," "A New Nation Is Launched," "Inch Pill," "Geometry," "Fraction Fun," and "Mini Unit on Percents." (JM)

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THE RIGHT TO READ

HANDBOOK I

READING SKILLS DEVELOPMENT IN CONTENT AREAS

HAMPTON CITY SCHOOLS

THE SCHOOL BOARD OF THE CITY OF HAMPTON, VA.

CS 001 343

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READING SKILLS DEVELOPMENT IN CONTENT AREAS

Handbook I

U.S. Office of Education

Right To Read Program
Project #OEG-0-72-1235

Hampton City Schools
Hampton, Virginia

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INTRODUCTION

The philosophy underlying the instructional suggestions of this handbook are nowhere clearer than in the instructional practice of the best teachers in Hampton's Right to Read Project. They and we hold this truth, and its necessary consequence to be self-evident: That all pupils enter a similar learning environment with different needs, understandings, and interests and that, consequently, pupils must be allowed to pursue individual appreciation of similar concepts through a very wide variety of structured activities. Moreover, it is our conviction that it is not only desirable but possible to teach reading, or information skills, in a setting where important information exists, in the content area classroom.

The instructional and organizational strategies by which the practice of this philosophy is made possible will be described in the two succeeding introductory sections. The remainder of the handbook is comprised of sample units of work which teachers have designed under the aegis of the Right to Read Program. Our hope and purpose is that teachers who study this work will see the possibility and practicality of excellent teaching, of giving every pupil the right to read.

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Director, Right to Read
Hampton City Schools

INSTRUCTIONAL STRATEGIES

In examining the units of work which are offered as examples in this handbook, you will often see reference to teacher-made materials which are an integral part of the instructional strategies the teacher employs. A brief description of the most common of these follows here, much in the same format as it was presented originally to the Right to Read teachers.

The Structured Overview

There is a theory of learning which holds that one's previous background of knowledge with regard to a particular subject is the principal variable influencing new learning. In other words, new understandings are acquired only in relation to a previously learned background of relevant concepts and principles. If the learner's existing cognitive structure is clear, stable, and organized, new learning will be enhanced.

The structured overview is a teacher-made device which can be used to help learners clarify what they already know about a unit or selection they are about to study. In addition, it is equally useful as a post-study review stimulus which may help learners clarify what they have learned. Structured overviews have two critical features:

1. They use the important vocabulary of a unit or selection to display the relationship between the concepts to be studied and those already familiar to the learner.

2. They allow for interaction between the teacher and learner through which modifications can be made based on the learner's cognitive structure as he reveals it through conversation.

Following is a step-by-step procedural description of the structured overview's construction and use. Note well that it is not an outline and it is not completed by the teacher alone. This is true since its substance is determined as much by what the students add to it as what the content of the unit suggests.

Steps in Constructing and Using Structured Overviews.

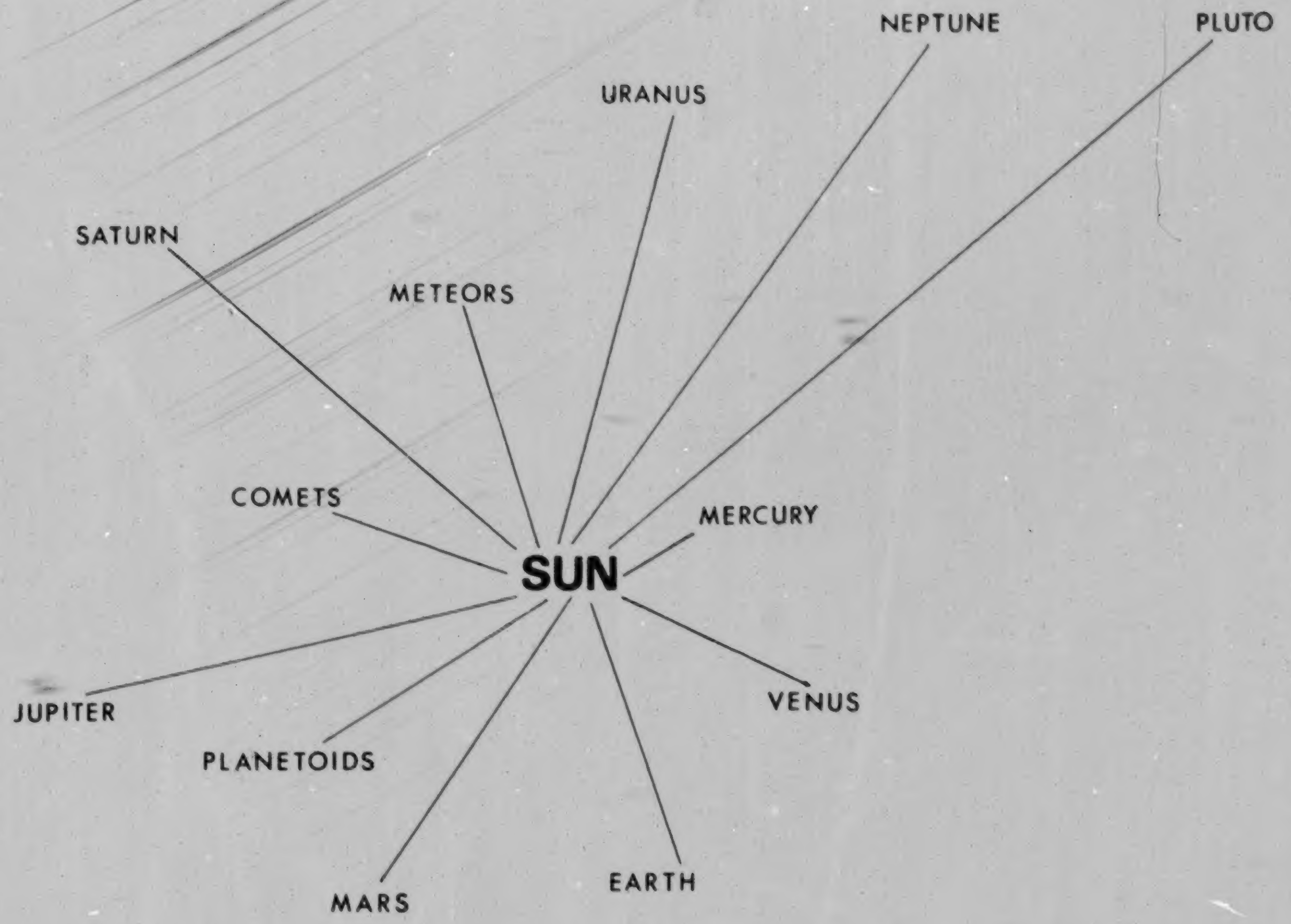
1. Analyze the vocabulary of the reading-learning task and list all the words that you feel are important for the students to understand.

2. Arrange the list of words until you have a diagram which depicts the interrelationships between the concepts particular to the learning task.

3. Add to the diagram vocabulary concepts which you believe are already understood by the students in order to depict relationships between the reading-learning task and the discipline as a whole.

4. Introduce the students to the reading-learning task by displaying the diagram and explaining why you arranged the terms as you did. Encourage them to supply as much information as possible.

5. During the course of the reading-learning task, relate the new information to the structured overview as it seems appropriate.


NEPTUNE
PLUTO
URANUS
SATURN
METEORS
COMETS
MERCURY
SUN
JUPITER
VENUS
PLANETOIDS
EARTH
MARS

THE SOLAR SYSTEM

THREE-LEVEL STUDY GUIDES

Comprehension seems to occur as more than a unitary act. For example, understanding what the constitution says is one thing, deciding what it means is quite another, and, finally, determing its application in specific settings requires the highest level of thinking possible. These three examples represent the three levels of reading in the three-level study guide. The levels are called, in order, literal, interpretive, and applied. In the same order, they involve understanding what the author said, what the author means, and how the information relates to previous experience and present settings.

Study guides should both simulate and stimulate comprehension. They should lead the reader through the comprehension process, habituating him to thinking in ways which, once mastered, will be useful to him in other similar settings. Following is an outline of the steps to take in constructing a three-level study guide.

I. Analyze the content of the reading selection.
Ask yourself:

A. What are the concepts and understanding which I want the students to derive?

B. Why am I requiring this activity of the students?

List as many of these understandings as you can think of.
You now have raw material from which you may draw level two (interpretive) statements. These statements should be inferences you think it reasonable to make judging from what the author says.

II. Pre-examine the content under consideration. Identify and list the statements of fact which are basic to understanding the content identified in Step I. That is, list statements rather directly from the selection which could be the base of the inferences you listed earlier. You now have raw materials from which you may draw level one statements. (Literal Level)

As you complete Steps I and II you will undoubtedly find that some of the understanding identified in Step I are not adequately supported by the details you were able to identify in Step II. On the other hand, you may identify important concepts in addition to the ones you foresaw in Step I.

Rearrange and rework the level one and two material until you get a reasonable fit. These content analysis steps will determine the success of the

the success of the guide in helping you and your pupils reach your objectives.

III. As the last step consider and list possible extensions or applications of the material.

Ask yourself:

A. What are the most generalized conclusions which can be drawn from this content?

List these possible applications of the material. These ideas will go into your level three section of the guide. It is a good idea to leave adequate space and to encourage pupils to make original, personal comments at this level.

Three Level Study Guide
"The Expanding Constitution"

Level I

Directions: Check the paragraph which best tells what happened in the reading selection.

_____ 1. Americans control their government because they elect the people who best represent their interests.

_____ 2. There are three branches of government.

_____ 3. The federal government has powers not held by the states.

_____ 4. The founding fathers feared that any government might become too powerful.

_____ 5. The states have the power to tax and borrow money.

_____ 6. The federal government controls marriage.

_____ 7. No single branch of government can gain all of the powers.

_____ 8. The Bill of Rights are useless.

_____ 9. The federal government has the power to tax and borrow money.

Level II

Directions: Check those items which are "correct" interpretations of parts of the reading selection. Be prepared to identify each interpretation you select with the part of the reading selection it interprets.

_____ 1. Some American governmental officials are elected directly.

_____ 2. Some American governmental officials are elected indirectly.

_____ 3. America represents fifty separate states held together by a federal union.

_____ 4. The author feels that a separation of powers is necessary in a democracy.

_____ 5. No human is able to handle too much power.

_____ 6. Some powers are held by both the federal and state government.

_____ 7. Each branch of government keeps an eye on all other branches.

_____ 8. All powers held by the federal government are also held by the states.

_____ 9. The Bill of Rights protects personal liberties.

_____10. Other ____

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Level III

Directions: Which of the following statements best express the meaning of the reading selection.

_____ 1. Dictators rule when people fail to rule.

_____ 2. Our federal union should be like a happy marriage.

_____ 3. There is no need for concern because our rights will always be there.

_____ 4. My vote does not count, so why bother.

_____ 5. Other ____

PATTERNS GUIDES

This kind of guide takes its name from the fact that it is based on the organizational pattern the author has used in communicating his message in print. Obviously, not all writing is organized around a discernable pattern, but where it is, the ability to use that pattern in comprehending a selection is invaluable. Many authors do set their arguments up around a cause/effect, temporal, comparison/contrast, or listing pattern. Patterns guides assist the maturing reader in using an author's organizational motif to more fully comprehend. Suggested steps in the construction of such guides follow.

Steps in Constructing Patterns Guide

1. Examine the text and selections students are to be asked to read. Is there an obvious pattern to the organization? Classify the selection, if possible, as cause/effect, comparison/contrast, etc.

2. Where an obvious pattern exists, prepare a guide which requires the reader to deal with the reader to deal with the information in the selection by reacting to its organization. Such a guide might require the following kinds of activity:

   (a) Matching causes to effects
   (b) Classifying statements under two or more comparative or contrasting categories
   (c) Rearranging statements in temporal order.

CONCEPT GUIDES

One method of helping students to develop conceptualizations is to use concept guides. These guides are based on the idea that learning is often a matter of awareness followed by association. That is, the learner first becomes conscious of an object or idea. To know it on a conceptual level, however, requires association with previous experience or ideas. Psychologically, this is related to the "chunking" phenomenon. According to the author of this idea, the learner remembers by grouping discrete bits of information together under a generic heading. Thus, the concept guide is designed to allow students to become consciously aware of information and then to "chunk" the input of facts, inferences, and ideas into more meaningful conceptual units through categorization and association.

The construction of a concept guide follows a two-step process similar to the steps involved in learning which were just discussed. The guide has two parts, one part in which the reader recognizes important facts and ideas from the reading and a second part in which he is asked to categorize these items with respect to two or more concepts.

STEPS IN CONSTRUCTING CONCEPT GUIDE

1. Analyze the reading passage to determine the major concepts the students should acquire. List each in a word or short phrase. Their number should be limited.
2. Reanalyze the passage and judiciously select statements which are the basis for the concepts chosen for emphasis in step (1). These statements, plus distractors, will form part I of the guide.

Directions to the student should have him examine the ideas listed in Part I to determine whether they represent facts in the reading. Then, in Part II, he should categorize the ideas, by number, with respect to conceptual headings.

CONCEPT GUIDE

The Solar System

Part I.

Check each of the following statements which you believe are true based on your reading.

1 - The sun is the center fo the solar system.

2 - The earth is the farthest planet from the sun.

3 - The planet closest to the sun is Mercury.

4 - Earth is 93,000,000 miles from the sun.

5 - A light-year is the distance light can travel in one year's time.

6 - The planetoids are located between Mars and Jupiter.

7 - Comets are as large as planets.

8 - Meteors are similar to moons, and orbit only around the earth.

9 - Meteors that strike the earth are called meteorites.

10 - Pluto is known as the dark planet.

Part II.

Each of the true statements in Part I is related to one of the headings below. List each statement under the proper heading.

SUN	INNER PLANET	OUTER PLANET

VOCABULARY BUILDING EXERCISES

There are innumerable exercises which can be used to build vocabulary, though some are more effective than others in specific settings. In general, people seem to learn words, or acquire vocabulary, in one of two ways. One way is direct and explicit; a model, either a person or text, provides information to define a word. For the young child, this is usually a parent who uses words to refer to objects and ideas, and the child, in observing this, learns the "mother tongue". A second way is indirect and implicit; experience with concrete and verbal contexts provides the need and opportunity for language to develop. In this setting, it is likely that some sort of criterial attribute system develops in the mind of the learner such that exemplars and non-exemplars of objects and ideas can be so classified. As a simple example of this, observe the very young child who learns first that there are furry things and not furry things, dogs and not dogs, Pomeranians and Collies, puppies and grown dogs, purebreds and mixtures, etc. (In developing these ideas, the child is learning the meaning caninus domesticus, though he may never come to know or use that term.)

The implications of this theoretical model of language acquisition is that students need experience with words followed by opportunity to classify words on a semantic level. Word puzzles, categorization exercises, matching exercises, word games, etc., are devices by which students can experience words. Following this experience, the student will need the opportunity to categorize vocabulary, either as part of a worksheet or in discussion.

For example, in the study of mammals the student will need to see or read about mammals and non-mammals. Following this, he should have opportunity to complete categorization exercises with the terms he has seen used in reference to mammals. The categories could be as simple as "Mammals", "Non-Mammals" or "Mammals", "Birds". "Reptiles". etc. They might also be "Live-bearing", "Egg Laying", "Have Fur", "Have Scales", etc.

THE CONTENT DRTA

Teachers in Hampton's Right-to-Read project employ a general lesson framework in directing reading lessons with students in subject-matter texts. The motif used is called the Directed Reading-Thinking Activity, or DRTA. Actually, they use a modification of the DRTA described by R. G. Stauffer in Directing Reading Maturity as a Cognitive Process, published by Harper-Row, 1970. Basically, the lesson framework has three parts: Pre-reading Anticipation, Information Search, and Reflective Reaction.

The Prereading Anticipation step of the lesson involves readiness for reading. The students are led to ask and answer the questions"What is this selection about?", "What do I know about this topic?" and "What may I expect to learn from this reading?" The structured overview is a device often used in this setting for this purpose.

The Information Search step is characterized by analytical reading of the selection. Various guide material is used to help students ferret out ideas in the reading selections. In every case, the objective is to get students into the habit of good search strategies.

The Reflective Reaction step is critical reaction. The students, under teacher direction usually ask and answer such questions as "Did what I read fill in gaps in my knowledge?", "How well did it suit my needs?", "Was my anticipation of what I was going to read accurate?", "Of what use to me is my new-found information?". This reflection is critical to the reading act. It allows the learner to deal with important ideas on an intellectually active level. Furthermore, it allows the teacher opportunity to guide the student's thinking toward understanding, to correct misconceptions before they are cemented.

ORGANIZATIONAL STRATEGIES

A diagnostic/prescriptive approach has been employed in the development of Hampton City Schools' Right To Read Program. Classroom organization in science, social studies and mathematics is based upon careful student diagnosis so that meaningful prescriptive activities can be properly employed by both teachers and students. Classroom organization within the Right To Read Program has three main divisions: (1) an organizational scheme which includes total class activities; (2) an organizational scheme for small group activities, and (3) an organizational scheme which includes individualized activities.

Total class activities may include such activities as diagnostic screening, general concept introduction and student-teacher planning. Small group activities may include specific concept introduction, specific skill teaching, teacher directed reading activities or teacher-student-group planning. Individualized activities may include many follow-up activities to concept introduction and skill teaching within total class and small group settings. Individualized follow-up activities may take the form of various work sheet assignments, individualized reading and study activities, interest center activities and skill station activities. A structured overview of this organizational scheme appears below.

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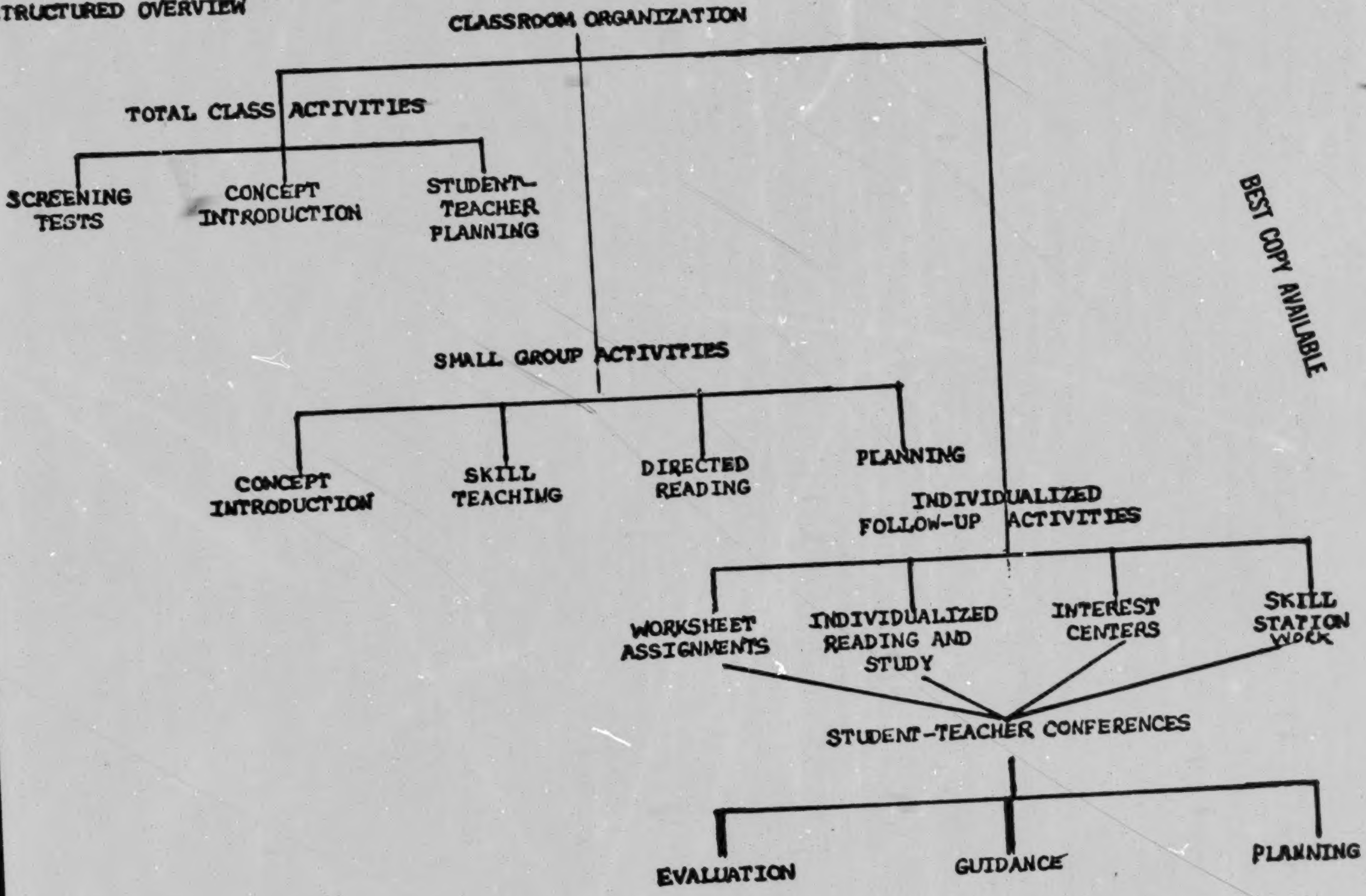
STRUCTURED OVERVIEW


CLASSROOM ORGANIZATION
TOTAL CLASS ACTIVITIES
SCREENING TESTS
CONCEPT INTRODUCTION
STUDENT-TEACHER PLANNING
SMALL GROUP ACTIVITIES
CONCEPT INTRODUCTION
SKILL TEACHING
DIRECTED READING
PLANNING
INDIVIDUALIZED FOLLOW-UP ACTIVITIES
WORKSHEET ASSIGNMENTS
INDIVIDUALIZED READING AND STUDY
INTEREST CENTERS
SKILL STATION WORK
STUDENT-TEACHER CONFERENCES
EVALUATION
GUIDANCE
PLANNING

Proper management and evaluative techniques are keys to the success of the organizational scheme outlined above. Teacher-student evaluation takes place formally and informally throughout this program. Teacher-student planning follows all total group and small group activities. Teacher-student conferences are usually held informally at the conclusion of individualized activities. Within the individual teacher-student conferences work is evaluated, necessary guidance is provided and future planning takes place.

The teacher must be able to manage all of the activities in which her students are engaged. The teacher must be able to monitor all students at all times. Various managerial devices have been devised and used by participants in the Right To Read Program. Record keeping devices which have been devised are assignment rolls and student log sheets. The assignment rolls serve the purpose of providing the teacher with a class roster of all students and the activities in which they are to be engaged for an entire week. This device provides the teacher with a technique for assigning specific activities to individual students or to groups of students who have needs which correspond to those skills developed within the specific activities assigned. This device also provides the teacher with a way of recording activities in which all of the students are engaged. The student log sheet is a weekly record keeping device provided for each student. The student keeps his log sheet in a personal folder which is provided for him in each of his classes. The student log sheet contains information as to the activities in which the student will engage for a given week. The log sheet also provides the student with an opportunity to evaluate his activities and it provides space for teacher comment and evaluation. Examples of the Assignment roll and the student log sheet are provided in the following pages of this handbook.

Name	Mon	Tue	Wed	Thur	Fri

ASSIGNMENT ROLL

STUDENT LOG

WEEK OF: ____________________

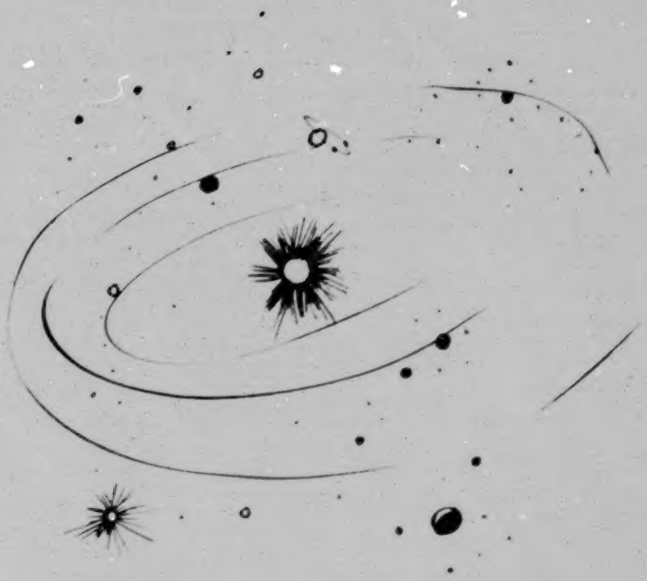
DAY	ACTIVITY NUMBER	STUDENT EVALUATION				TEACHER COMMENTS
Monday						
Other						
Tuesday						
Other						
Wednesday						
Other						
Thursday						
Other						
Friday						
Other						

Reading goal for this week: ________ pages per day

Reading accomplishment: ______ average per day

CONTENT AREA STUDY UNITS

THE UNIVERSE



by

Richard M. Taylor
Earth Science Teacher
Thorpe Junior High School

Concepts and Objectives

Students will be able to demonstrate an understanding of the following.

1 - The sun is the center of the solar system.

2 - The planets revolve around the sun.

3 - There are nine planets in our solar system.

4 - The planets vary in size, shape and the distance they travel around the sun.

5 - Some planets have moons, others do not.

6 - Other masses are also found revolving around the sun, asteroids, meteoroid, moons.

7 - There is not life on all planets.

8 - Gravity is caused by an interaction of the sun and the Earth's revolution.

9 - Climate and seasonal changes are caused by the Earth's position relative to the sun.

10 - Stars, Galaxies, and Quasars are also part of our Universe.

The books and materials listed on the following pages are keyed to the concepts and objectives which will be emphasized in this unit.

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Materials	Concepts									
	1	2	3	4	5	6	7	8	9	10
1. Knowledge Aid Tapes - (Knowledge Aid Division, 6633 West Howard St., Niles, Illinois 60648) This tape series included various programs on the universe. A study guide and a self - evaluation activity is provided for each program. Tape programs on the universe are:										
a) "The Moon"					X	X				
b) "The Sun"	X	X				X		X	X	
c) "The Planets"		X	X	X	X		X	X	X	
d) "Asteroids, Meteroids, Comets"						X				
e) "Stars, Galaxies, and Quasars"										X
2. What Is A Solar System by Theodore W. Munch Benefic Press, Chicago. 1961. (Book for basic students)	X	X			X	X				
3. What Is Gravity by Fred M. King and George R. Otto, Benefic Press, Chicago. 1960 (Book for basic students)								X		
4. What Is A Star by Daniel Q. Posin, Benefic Press, Chicago. 1961. (Book for basic students)						X				X
5. Let's Find Out About the Moon by Martha and Charles Shapp. Franklin Watts, Inc., New York, NY 1965. (Book for basic students).					X	X				
6. Junior Science Book of Stars by Phoebe Crosby, The Garrard Press, Champaign, Illinois. 1960. (Book for basic students)						X				X
7. Reader's Digest Science Reader - by Reader's Digest Services, Inc. Pleasantville, NY a) Green Book/Reading Level 4th Grade b) Red Book /Reading Level 5th Grade c) Blue Book/Reading Level 6th Grade d) Orange Book/Reading Level 7th Grade (For basic students)	X	X	X	X	X	X	X	X	X	X
8. Know the Stars by H. A. Rey, Scholastic Book Services, New York, NY 1969. (Book for basic students)										X
9. Astronomy by Herbert S. Ogden and M. Vere De Vault, Stock - Vaughn Company, Austin, Texas, 1969. (Book for basic students)	X	X	X	X	X	X	X	X	X	X
10. Comets and Meteors by Isaac Asimov, Follett Publishing Co., Chicago. 1972. (Book for basic students) Unit 4 and 5, pps. 37-62						X				

Materials	Concepts									
	1	2	3	4	5	6	7	8	9	10
11. This Earth of Ours, Unit 4 and 5, pps. 37-62, by Kay L. Ware and Gertrude B. Hoffsten, Stock - Vaughn Company, Austin, Texas, 1965 (Paperback text - excellent for average students - Work-book type).	X	X	X	X	X	X	X	X	X	X
12. Earth Science, Chapters 31, 33 and 34, by F. Martin Brown, Grace H. Kemper and John H. Lewis, Silver Brudett Company, Morristown, N. S. 1970. (Difficult for average students)	X	X	X	X	X	X	X	X	X	X
13. Focus on Earth Science, Chapters 21, 22, and 23, by Margaret S. Bishop, Phyllis G. Lewis, and Richmond L. Beonaugh, Consultant, Charles E. Merrill Publishing Co., Columbus, Ohio, 1969.	X	X	X	X	X	X	X	X	X	X
14. Construction Art Materials such as poster paper, construction paper, drawing paper, scissors tape, glue, crayons, magic markers, etc.										
15. Space Cross Word Puzzle - Moon - Ideal School Supply, Oak Lawn, Illinois, 1969.					X	X				
16. Space Cross Word Puzzle - Solar System - Ideal School Supply, Oak Lawn, Illinois. 1969.	X	X			X	X				X
17. Structured Overview - The Universe	X	X	X	X	X	X	X	X	X	X
18. Study Guide - The Universe --	X	X	X	X	X	X	X	X	X	X

The activities listed on the following pages are keyed to the concepts and the materials.

Activities	Materials	Concepts									
		1	2	3	4	5	6	7	8	9	10
10. Read "Why Outer Space is Black" on p. 34 of the Reader's Digest Green Book on p. 38. Complete the "Do This Yourself" exercise. (Individual Activity)	7a				X		X	X			
11. Read "The Voyage to Venus" on p. 4 of the Reader's Digest Orange Book. On p. 15 Read "The Thing That Hit Us From Space." (Individual Activity)	7d		X	X			X		X		
12. Read "The Moon - Stepping Stone to Space" on p. 50 of the Reader's Digest Red Book. Make a drawing to illustrate something you learned in this chapter. (Individual Activity)	7b,14					X					
13. Read "The Great Meteor of 1947" on p. 26 of the Readers Digest Blue Book. (Individual Activity)	7c						X				
14. Read "Why Stars Twinkle" on p. 32 of the Reader's Digest Blue Book. (Individual Activity)											X
15. Read Unit 4, "The Solar System" on p. 37 of This Earth of Ours. (Whole Group DRTA with a Structured Overview and a concept guide). (Note to the Teacher: The structured overview and the Concept guide are included within this unit).	11,17,18	X	X	X	X	X	X	X	X	X	X
16. On p. 47 of This Earth of Ours, Complete Section F, "How Well Do You Know Your Science Vocabulary?" Copy column 2. (Individual, small group, or whole group activity)	11	X	X	X	X	X	X	X	X	X	X
17. On p. 47 of This Earth of Ours answer question #1 in section	11	X									
18. On p. 50 of This Earth of Ours answer question #21. Number your paper from 1 to 8 and write the proper word next to each number.	11		X	X							

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Activities	Materials	Concepts									
		1	2	3	4	5	6	7	8	9	10
1. Listen to the Knowledge Aid Tape, "The Sun". Complete the study guide and self-evaluation. (Small Group Activity)	16	X	X						X		
2. Listen to the Knowledge Aid Tape, "The Planets". Complete the study guide and self-evaluation. (Small Group Activity)	1C		X	X	X	X		X			
3. Listen to the Knowledge Aid Tape, "The Moon". Complete the study guide and self-evaluation. (Small Group Activity)	1A					X	X				
4. Listen to the Knowledge Aid Tape, "Star, Galaxies and Quasars". Complete the study guide and self-evaluation. (Small Group Activity)	1E										X
5. Listen to the Knowledge Aid Tape, "Asteroids, Meteoroids, and Comets. Complete the study guide and self-evaluation. (Small Group Activity)	1D						X				
6. Read the book What Is A Solar System. It is a very short book. Write 5 sentences using 5 of the 7 words in the picture dictionary at the end of the book. This should be done on notebook paper and kept in your folder. (Note: In preparing students for reading this book an individual or small group DRTA can be employed to introduce students to Chapter I.)	2	X	X	X	X	X	X				
7. Read the book Let's Find Out About The Moon. Make a drawing to show one of the things you learned about the moon from reading this book. (Individual Activity)	5,14					X	X				
8. Draw and label two constellation using the Junior Science Book of Stars as a reference. (Individual Activity)	6,14										X
9. Complete the two crossword puzzles on the Moon and the Solar System. (Individual Activity)	15,16	X	X			X	X				

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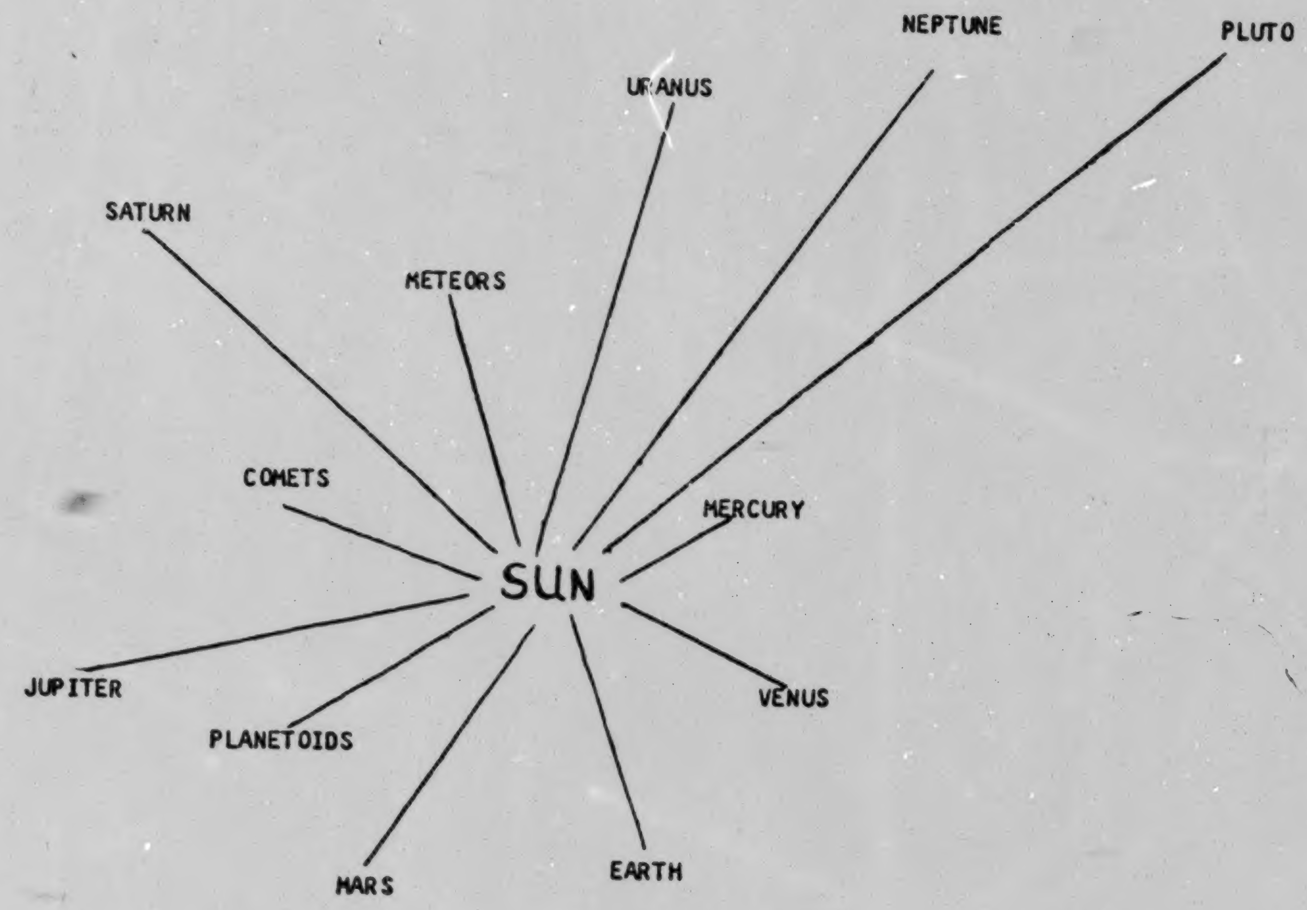
Activities	Materials	Concepts 1	2	3	4	5	6	7	8	9	10
19. Read the book What Is A Star. Write a paragraph containing five of the nine words in the picture dictionary at the end of the book. This should be done on notebook paper and kept in your folder. (Individual Activity)	4										
20. Read the book Astronomy. Draw and label 2 constellations. (Individual Activity)	9,14										
21. Read Unit 5, "The Movements of the Earth" on p. 53 of This Earth of Ours. (Your teacher will direct you in this activity by using a DRTA with a small group)	11									X	
22. Focus on Earth Science - Read Chapter 21, pps. 422-441, (Small Group Teacher directed DRTA Activity for average students) Note: The teacher should choose following student activities from this chapter.	13	X	X	X	X	X	X	X		X	
23. Earth Science - Chapter 31, pps. 483 - 493, (Teacher directed Activity for above average students) Note: The teacher should choose other optional followup student activities from this chapter.											
24. Pick 4 of the 9 planets and draw them as they appear looking through a telescope. Use any references available in the classroom.	14	X	X	X							
25. On notebook paper make a list of the planets as they are in order beginning with those nearest to the sun. Use any classroom references.	14	X	X	X							
26. On notebook paper make a list of the planets by size from smallest to largest. Use any classroom references.	14	X	X	X							
27. Complete the Concept Guide on The Universe.	18	X	X	X	X	X	X	X	X	X	X

Activity 17 - STRUCTURED OVERVIEW


PLUTO
NEPTUNE
URANUS
SATURN
METEORS
COMETS
MERCURY
SUN
JUPITER
VENUS
PLANETOIDS
MARS
EARTH

THE SOLAR SYSTEM

CONCEPT GUIDE

The Solar System

Part I.

Check each of the following statements which you believe are true based on your reading.

1 - The sun is the center fo the solar system.

2 - The earth is the farthest planet from the sun.

3 - The planet closest to the sun is Mercury.

4 - Earth is 93,000,000 miles from the sun.

5 - A light-year is the distance light can travel in one year's time.

6 - The planetoids are located between Mars and Jupiter.

7 - Comets are as large as planets.

8 - Meteors are similar to moons, and orbit only around the earth.

9 - Meteors that strike the earth are called meteorites.

10 - Pluto is known as the dark planet.

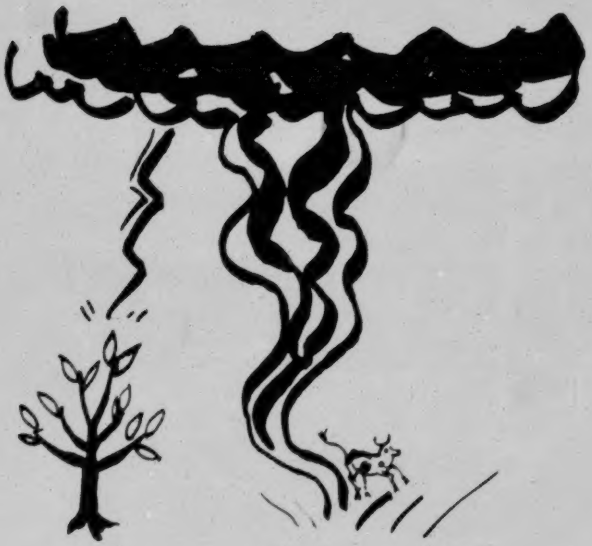
Part II.

Each of the true statements in Part I is related to one of the headings below. List each statement under the proper heading.

SUN	INNER PLANET	OUTER PLANET

Meteorology:

The Study of Weather



by

Richard M. Taylor
Earth Science Teacher
Thorpe Junior High School

Concepts and Objectives

Students will be able to demonstrate an understanding of the following concepts:

1. Weather is the condition of the atmosphere.
2. Weather prediction is important to everyone.
3. Many instruments are used to measure the weather elements.
4. Air masses are large masses of air with the same temperature and humidity.
5. Fronts form at the meeting of air masses.
6. Weather can be predicted from the nature and paths of fronts.
7. Weather maps show daily weather conditions across the country.
8. Disturbances in the air result in the creation of various storms.
9. Weather predicting is a new science.
10. Climate is the average weather of a given place.

The books and materials listed on the following pages are keyed to the concepts and objectives which will be emphasized in this unit.

Books and Materials	Concepts									
	1	2	3	4	5	6	7	8	9	10
1. Knowledge Aid Tapes (Knowledge Aid Division, 6633 West Howard St., Niles, IL 60648 c1970) This tape series includes various programs on meteorology plus a student study guide and self-evaluation activity for each program. Tape programs on Meteorology are:										
a) "Composition of the Atmosphere"	X			X	X	X	X	X		
b) "Layers of the Atmosphere"	X				X			X		
c) "The Water Cycle"	X			X		X				
d) "Cloud Formations"	X			X	X	X		X		
e) "Storms"								X		
2. Pathways-II - Unit III, "Predicting The Coming Weather", Chapters 1-6, by Joseph M. Oxenhorn, Globe Book Co., Inc., New York 1969. Book written on 5th to 6th grade level, excellent for basic students.	X	X	X	X	X	X	X	X	X	
3. Earth Science-Chapters 14 and 15. "Air Pressure and Winds" and "Storms Cross Our Continent" by Brown, Kemper, and Lewis, Silver Burdett Co., 1970. Earth Science Text, difficult for average students.	X	X	X	X	X	X	X	X		X
4. Focus on Earth Science, Chapter 10, "Winds and Weather" by Bishop, Lewis, and Bronaugh, Charles E. Merrill Co., Columbus, Ohio, 1969. Text, adequate for average students.	X	X	X	X	X	X	X	X		X
5. Learning To Use Science, Unit 6, "Weather Forecasting" by Ware and Hoffsten, Steck-Vaughn Co., Texas, 1965. Paperback workbook. Excellent for average students.	X	X	X	X	X	X		X		
6. Demonstration Thermometer		X	X							
7. Demonstration Barometer		X	X							
8. Local Newspaper - Weather Map.		X								
9. Weather Forecast Computer. Weather Dial - Taylor Instrument Co., Rochester, NY			X			X			X	
10. Evening T.V. Weather Report		X	X	X	X	X	X	X		
11. Various Library Resources	X	X	X	X	X	X	X	X	X	X
12. Filmstrips and Movies available from Audio-Visual Center. (ERC)	X	X	X	X	X	X	X	X	X	X
13. Structured Overview (Teacher-made)	X	X	X	X	X	X	X	X	X	X

Books and Materials	Concepts									
	1	2	3	4	5	6	7	8	9	10
14. Study Guide (Teacher-made)		X		X	X			X		X
15. School Telephone	X	X	X							
16. Construction Materials--poster paper, construction paper, scissors, tape, glue, etc.										

Students and teacher-directed activities are keyed to the materials and the concepts.

Activities	Materials	Concepts									
		1	2	3	4	5	6	7	8	9	10
1. Listen to the Knowledge Aid Tape, "Composition of the Atmosphere." Complete the study guide and self-evaluation.	1a	X			X	X	X	X	X		
2. Listen to the Knowledge Aid Tape, "Layers of the Atmosphere." Complete the study guide and self-evaluation.	1b	X				X			X		
3. Listen to the Knowledge Aid Tape, "The Water Cycle". Complete the study guide and self-evaluation.	1c	X			X		X				
4. Listen to the Knowledge Aid Tape, "Cloud Formations." Complete the study guide and self-evaluation.	1d	X			X	X	X		X		
5. Listen to the Knowledge Aid Tape, "Storms." Complete the study guide and self-evaluation.	1e								X		
6. Pathways-Read Chapter 1, pp. 82-85. On p. 86, answer the questions in Section III-Knowing What and Why? and Section IV-On the Ladder of Understanding. Copy the question & answer.	2	X	X	X							X
7. Pathways-Read Chapter 2, pp. 87-92. On p. 93 complete Section III-Knowing What and Why? And Section V-Matching Exercise.	2			X							
8. Pathways-Read Chapter 3, pp. 94-98. On p. 99 complete Section III-Knowing What and Why, Section IV. Finish the story, and Section V. Choose the proper word.	2				X	X	X				
9. Pathways-Read Chapter 4, pp. 100-103. On p. 104, complete section III-Knowing What and Why?	2	X	X	X	X	X	X	X			
10. Pathways-Read Chapter 5, pp. 105-110. On p. 110 complete Section III-Knowing What and Why?	2	X	X	X	X	X	X		X		
11. Pathways-Read Chapter 6, pp. 112-116. On p. 117 complete Section III-Knowing What and Why? and Section IV-Understanding the ideas.	2				X		X	X			X

Activities	Materials	Concepts									
		1	2	3	4	5	6	7	8	9	10
12. Pathways-From the glossary on p.119, pick any 15 words and write a sentence using them.	2	X	X	X	X	X	X	X	X	X	X
13. Pathways-From Chapter 2, pp. 87-92, pick one weather instrument and draw it as best you can. These are to be used to decorate the room.	2			X							
14. Pathways-From Chapter 3, pp. 94-98, pick one of the charts and copy it on poster paper to be hung in our room. Be sure your poster is presentable for display.	2				X	X					
15. Pathways-From Chapter 4, pp. 100-104, make a chart displaying some of the weather picture symbols.	2							X			
16. Pathways-From Chapter 5, pp. 105-110, make a diagram showing one of the "Freaks of Weather".	2								X		
17. Pathways-From Chapter 6, pp. 112-116, make a chart of the five "keys" that determine weather from place to place.	2	X	X	X						X	
18. Go to the library and record on notebook paper what you can discover about meteorology. Write a brief report on your findings.	11	X	X	X	X	X	X	X	X	X	X
19. Go to the library and record on notebook paper what you can discover about temperature and humidity.	11	X									
20. Go to the library and record on notebook paper what you can discover about precipitation.	11	X									
21. Earth Science-Read Sections 14-1 - 14-4, pp. 187-195. From the study guide on p. 195-196, answer questions 1, 2, 3, and 5. DRTA-with spontaneous structured overview from the class. Large group activity.	3				X						
22. Earth Science-Read Section 14-5 - 14-8, pp. 196-202. From the study guide on p. 202, answer questions 1, 3, 5, 6. DRTA-Let the students individually construct a structured overview of what they read.	3				X				X		

Activities	Materials	Concepts									
		1	2	3	4	5	6	7	8	9	10
23. *Earth Science*-Read Sections 15-1 - 15-2, pp. 205-208. From the study guide on p. 208. Answer questions 1, 2, 3, 4. DRTA-Structured Overview.	3				X	X	X		X		
24. *Earth Science*-Read Sections 15-3 - 15-4, pp. 208-217. From the study guide answer questions 1, 2, 4. DRTA-Structured Overview.	3							X	X		
25. *Earth Science*-Read Section 15-5 - 15-7, pp. 218-224. From the study guide answer questions 1, 2, 4, 5. DRTA-Structured Overview.	3								X		
26. *Focus on Earth Science*-Read Chapter 10, pp. 182-200. On p. 200 answer Section B-Mutiple Choice and also questions 2, 3, 6, 7, 8, 10. From Section C-Completion. Study Guide.	3	X	X		X	X	X		X		X
27. *Learning To Use Science*-Read Unit 6, pp. 67-74. Small Group-Oral-DRTA.	3	X	X	X	X				X		X
28. *Learning To Use Science*-On p. 74 complete Section F. How well do you know your vocabulary? Copy column 1 and fill in the blank with the letter of the correct answer.	5			X	X	X			X		
29. *Learning To Use Science*-On p. 75 - Section G - How much do you remember? Complete all parts of question No. 1 and also questions 2 and 3.	5	X	X				X		X		X
30. *Learning To Use Science*-On p. 75 - Answer question 4 - Keep a record of the weather for a week. Copy the chart and put it in your notebook. Each day when you come to class be sure to record the day's weather.	5 5	X	X	X				X	X	X	X
31. *Learning To Use Science*-On p. 76 - Answer or complete question 5 on drawing paper. This will be displayed in the room, so do your best work.	5	X							X		
32. *Learning To Use Science*-On p. 77 - Complete all parts of question no. 6.	5	X		X	X	X	X		X		

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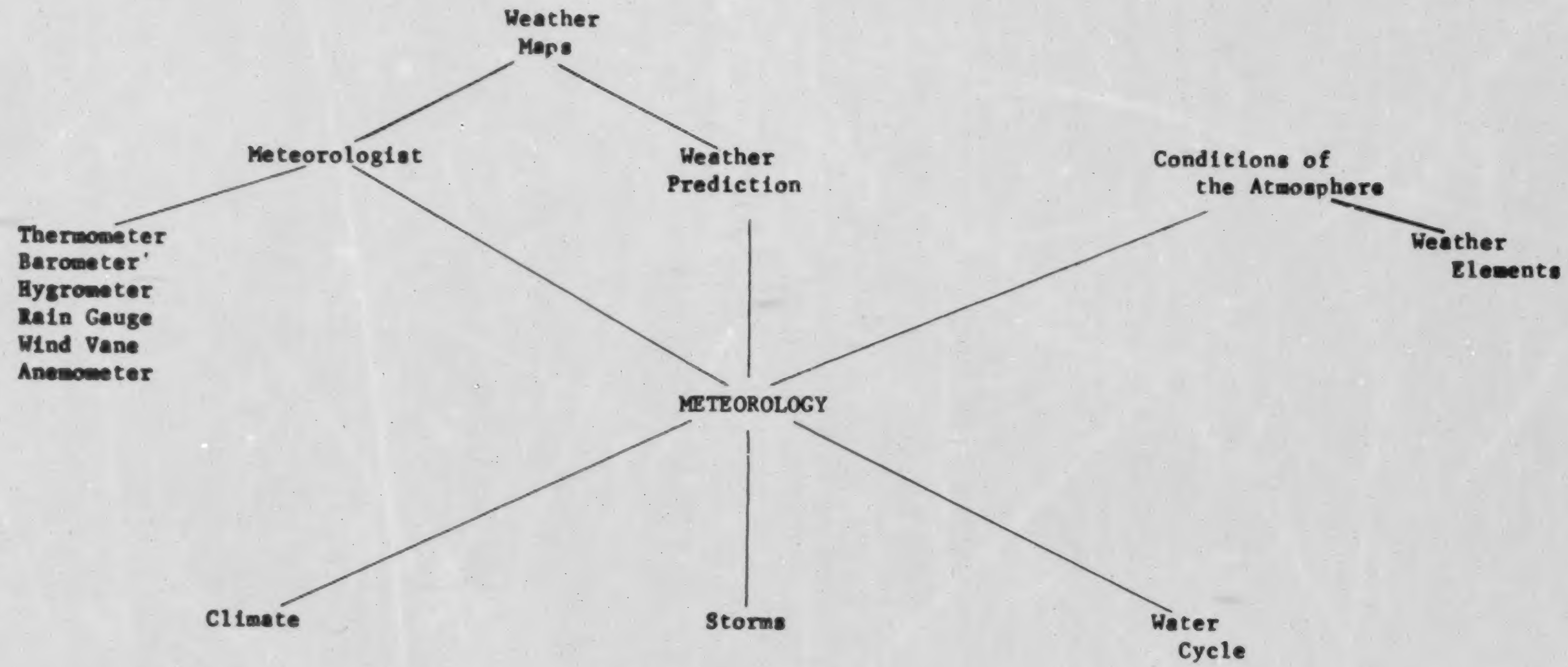
Activities	Materials	Concepts									
		1	2	3	4	5	6	7	8	9	10
33. Learning To Use Science-On p. 77 - Complete question No. 7-You may use the book to look-up the answer if you do not know them.	5			X							
34. Learning To Use Science-On p. 78 - Complete question H. On notebook paper copy the word that is spelled correctly. Do not write in the book.	5			X		X	X				
35. Learning To Use Science-On p. 78 - Complete parts I and II of question 8.	5	X	X	X	X	X	X	X	X	X	X
36. Learning To Use Science-Go to the library and answer question I on p. 79. Answer as many parts as you can. Be sure to take the book with you. Also you may use the library reference books.	5	X		X		X	X	X	X	X	
37. Observe the large demonstration thermometer hanging in the room. On notebook paper record the temp. in the classroom, then take the thermometer outside and record the temp. in at least 3 other places outside the building.	6			X							
38. From our local newspaper cut out the weather map and bring it to class for 5 days in a row. Glue these to poster paper to be hung in the room.	8	X	X	X	X	X	X	X	X	X	X
39. With the assistance of your teacher learn how to use the weather forecast computer and predict the weather for the next 24 hours.	9	X	X	X	X	X	X	X	X	X	X
40. Watch the evening local weather on television and on notebook or poster paper write your own weather outlook.	10	X	X	X	X	X	X	X	X	X	X
41. Meteorology-Structured Overview may by used as an introduction--possibly with a DRTA, a follow-up, or as a test. In any case it would be used as a large group activity.	13	X	X	X	X	X	X	X	X	X	X
42. Go to the office and use the school telephone to call our local recorded weather forecast. Make a copy of what is said and bring it back to class.	14	X	X	X							

Activities	Materials	Concepts									
		1	2	3	4	5	6	7	8	9	10
43. Using the construction materials and the Learning To Use Science book as a guide, construct your own rain gauge.	5, 16			X							
44. Using the construction materials and the Learning To Use Science book as a guide, construct your own wind vane.	5, 16			X							
45. Using the construction materials and the Learning To Use Science book as a guide, construct your own thermometer.	5, 16			X							
46. Using the construction materials and the Learning To Use Science book as a guide, construct your own barometer.	5, 16			X							
47. Using the construction materials and the Learning To Use Science book as a guide, construct your own hygrometer.	5, 16			X							
48. Clip the weather forecast from the local newspaper each day for a week and mount it on poster paper. Next to it record the day's actual weather. Was the newspaper correct?	8		X								
49. Watch the evening weather on TV and record it on paper each day for a week. Was it correct?	10		X	X	X	X	X	X			
50. From the movie "Weather" record the type of weather instruments and what they measure.	12	X	X	X	X	X	X	X	X	X	X

STRUCTURED OVERVIEW


Weather
Maps
Meteorologist
Weather
Prediction
Conditions of
the Atmosphere
Weather
Elements
Thermometer
Barometer'
Hygrometer
Rain Gauge
Wind Vane
Anemometer
METEOROLOGY
Climate
Storms
Water
Cycle

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Study Guide - Activity No. 26

I. Check the two statements that best tell what this chapter is about.

_____ 1. The sun is a source of energy.

_____ 2. Major wind systems have much influence on our weather.

_____ 3. Rain is the biggest cause of flooding.

_____ 4. Weather includes the day to day changes in wind, temperature, humidity, and pressure.

II. Check those statements which are true or correct.

_____ 1. Between latitudes 23½ north and south, the east receives more energy than any other region.

_____ 2. Eddies are circular currents.

_____ 3. Cold air rises.

_____ 4. Polar winds are cold.

_____ 5. Tropical winds are warm.

_____ 6. Thunderstorms occur when warm air is pushed downward.

_____ 7. Thunderclouds generate electricity.

_____ 8. Tornadoes form when a mass of warm air becomes trapped between two layers of cold air.

_____ 9. Hurricanes are stronger than tornadoes.

____ 10. Tornadoes cover more area than a hurricane.

III. Check the two statements that best summarize the chapter.

_____ 1. Weather prediction is important to the health and safety of everyone.

_____ 2. Climate is the result of many factors that determine the weather of an area.

_____ 3. Rainfall in deserts is less than 10 inches/year.

_____ 4. Clouds are condensed moisture.

_____ 5. Rainforests occur where rainfall is especially abundant.

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Evaluation Exercise - No. 1

1. List 3 weather elements.
   a)
   b)
   c)

2. What is weather?

3. What is meteorology?

4. List four weather instruments and tell what they measure.

5. What is the difference between a maritime air mass and a continental air mass?

6. Explain the difference between a polar air mass and a tropical air mass.

7. Why do lower latitudes have warmer climates?

8. Which layer of the atmosphere might be called the weathersphere?

9. ______________________ is made up of tiny particles of heated moisture that float through the air.

10. When small moisture particles cool and group together to form clouds, this is called ____________________________.

Evaluation Exercise - No. 2

1. Water vapor is like a ______________________.
   a) solid b) liquid c) gas

2. Which gas affects the weather?
   a) water vapor b) oxygen c) nitrogen

3. The most abundant gas in the atmosphere is __________________.
   a) cabon dioxide b) oxygen c) nitrogen

4. About 20% of the atmosphere is ____________________.
   a) oxygen b) water c) nitrogen

5. Which layer of the atmosphere might be called the "weathersphere"?

6. The ozone layer is very important because it absorbs ____________________.

7. Which layer of the atmosphere reflects radio waves best?

8. ________________________ is made up of tiny particles of heated moisture that float through the air.

9. Another word that means the same as rain is ___________________.

10. The changing of water into water vapor is called __________________.

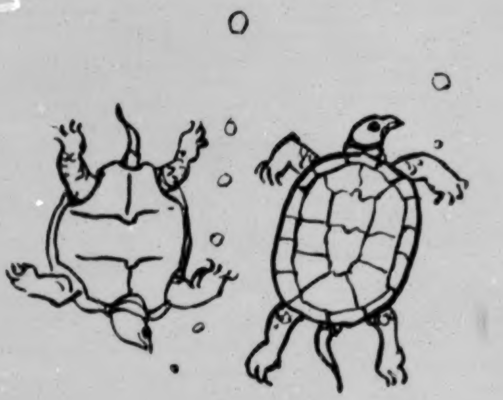
11. The continuous weather system that provides the earth with rain is called the ________________________.

12. _______________________ and ________________________ cause water to evaporate.

Evaluation Exercise - No. 3

1. List five weather elements.
2. What is weather?
3. List six weather instruments and tell what they measure.
4. What is an air mass?
5. What is a front?
6. What is the difference between a maritime air mass and a continental air mass?
7. What is the difference between a polar air mass and a tropical air mass.
8. Explain how thunderstorms are created.
9. How are hurricanes formed?
10. Define climate.
11. Why do lower latitudes have warmer climates?

Water Communities



by

John M. King
Life Science Teacher
Thorpe Junior High School

Introduction

In this unit the students will study fresh water and marine ecology. This is an integrated unit as opposed to studying each water community separately. There is a varying degree of difficulty among the activities to accomodate student interest and ability. Various teaching methods are also used. This unit will take approximately nine weeks to complete.

Concepts For Emphasis

The student will be able to:

1. Identify common fresh and salt water organisms.
2. Identify and explain the function of structures found in the following representatives: Fish, Frog, Clam, Crayfish, Starfish, Jellyfish
3. Compare and contrast the Phyla studied.
4. Explain the flow of energy and relationships occurring with each community.
5. Discover the relationships of these communities to man.
6. Recognize the physical differences between fresh and salt water.
7. Gain an understanding concerning the forces that act upon fresh and salt water.

The books and materials listed on the following pages are keyed to the concepts and objectives which will be emphasized in this unit.

MATERIALS LIST

Materials	Concepts						
	1	2	3	4	5	6	7
A. Smallwood Zoological Charts 1. "Echinodermata" (Shows various types of this phylum, also structures of the starfish)	X	X	X				
2. "Coelenterata" (Labeled drawings of the jelly-fish and hydra)	X	X	X				
3. "Porifera: (Structure and types of this phylum)	X	X	X				
4. "Chordata - Fish" (Two charts one showing types, the other drawings of anatomy)	X	X	X				
5. "Arthropoda - Crustaceans" (Types of crustacean, anatomy of the crayfish and crab)	X	X	X				
6. "Chordata - Amphibia - Frog" (Two charts one showing anatomy, the other development)	X	X	X				
B. Reader's Digest Science Readers (Read, Green, Orange and Blue Levels) 7. "Alaska's Marvelous Monster - The King Crab" (Gives a history of the King Crab industry in Alaska then describes the life style of a King Crab)	X		X	X	X		
8. "Our World Under Water" (Explains how the topography of the ocean floor is similar to that on land)							X
9. "The Friendly Dolphin" Young girls attachment to a tame Dolphin. (Accurate description of this mammal)	X		X		X		
10. "The Sociable Sea Gull" (Good account of the behavior of gulls, includes territorial rights nest building, mating dance)	X			X	X		
11. "How Odd the Oyster" (Life cycle of the oyster and description of oyster farming)	X	X		X	X		
12. "Why Is Water Wet?" (Elementary explanation, emphasis on molecular structure)						X	X
13. "The Lake I Lived With" (Surveys the different organisms found in or near a lake)	X		X	X			
C. Pathways in Science - Earth Science, Physics, Biolog 14. The Life Cycle of a Fish, Biology Book, page 75 (Explains the various stages of development)		X					
15. "The Life Cycle in Frogs and Reptiles", Biology Book 3, page 80 - (Explains the various stages of development)		X					

MATERIALS LIST

Materials	Concepts						
	1	2	3	4	5	6	7
16. "The Waters of the Ocean" Earth Science Book 2, Unit IV							
Chapter 2 - The Nature of Ocean Water - (Differences explained between fresh and saltwater)						X	
Chapter 4 - The Restless Ocean Waters (Tides and currents are explored)							X
Chapter 5 - Citizens of the Ocean (Surveys types of animal groups found in the oceans)	X		X				
Chapter 6 - Gifts from the Sea - (A study of minerals, seafood industry, desaltation)					X		X
17. "Floating and Sinking" Physics Book 2, page 135 - (Explains the forces behind the floating of an object)							X
18. "The Water Cycle" Chemistry Book, page 122 (Stages of the water cycle)						X	X
D. Ecology Laboratory - Learning in Science II, SRA (all items include a set of questions) 19. "The Seahorse" Big Idea One - E - (Various zones of the ocean beginning with the shore)				X			
20. "Sea Cycles" Big Idea Two - D - (Energy pyramid and food chains)				X			
E. Graph and Picture Study Skills - SRA 21. "The Water Cycle" Charts and Diagrams Level One #2 (Drawing of cycle)						X	X
22. "The Process of Canning Salmon" Charts and Diagrams Level Two #1 (Salmon industry from boats to table)	X				X		
23. "How Water is Purified" Charts and Diagrams Level Two (Chart on water purification)						X	
24. "Salmon Fishing" Photos - Process Level One #7 (Set of photographs describing salmon fishing)	X				X		
F. Filmstrips (H. W. Thorpe Jr. High Library's catalog number is given) 25. "Living things of the Sea" Thorpe Library #861 (Various Phyla found in the oceans)	X						
26. "Flatworms and Echinoderms" Thorpe Library #1089 (Second part of the film describes life style of starfish)	X	X	X	X			
27. "How Animals Live in the Sea" Thorpe Library #1119 (Relationships in the marine community)	X			X			

MATERIALS LIST

Materials	Concepts						
	1	2	3	4	5	6	7
28. "The Clam" Thorpe Library #1122 (Basic facts preparation for the dissection)	X	X					
29. "The Frog" Thorpe Library #1127 (Basic facts preparation for the dissection)	X	X					
30. "The Fish" Thorpe Library #1127 (Basic facts preparation for the dissection)	X	X					
31. "How Animals Live in Freshwater Thorpe Library #1117 (Relationships in the freshwater community)	X						
G. Slides (H. W. Thorpe Jr. High Library's catalog number)							
32. "Sea Life" Thorpe Library #1354-1373 (Major phyla of marine animals)	X						
33. "Lobster or Crayfish" Thorpe Library #1178-1193 (Steps in dissection)		X					
34. "Frog anatomy and dissection Thorpe Library #1194-1213 (Steps in dissection)		X					
H. Transparency							
35. Starfish Anatomy (Steps in dissection)		X					
I. 16mm films (Hampton Schools Educational Resource Center)							
36. "The Sea" (Discusses both physical and biological oceanography)	X		X	X	X		X
37. "Plankton-Pastures of the Ocean" (Surveys the energy pyramid in the oceans, photosynthesis)	X			X			X
38. "Shell fishing in the Chesapeake Bay" (Crab, oyster, clam industries are discussed)	X				X		
J. Film loops - Hubbard Scientific Co.							
39. Ocean Tides (Explains the causes and effects of ocean tides on the shoreline)							X
40. Ocean Circulation (Surface currents - causes and effects)							X
41. Ocean Circulation (Depth currents - causes and effects)							X
42. Ocean Salinity (Causes and effects)							X
43. Ocean Temperature (Explains gradients and water flow)							X

MATERIALS LIST

Materials	Concepts						
	1	2	3	4	5	6	7
K. Supplementary Textbooks 44. The World of Living Things - (Used as a reference source for information on particular organisms and other subjects)	X	X	X	X			
45. Life: Its Forms and Changes (Reference source)	X	X	X	X			
46. Life Science, Ginn & Company - Unit 5, "Animal Organs and Systems - The Frog"	X	X	X				
47. Man and the Enviroment - Investigation 13, Houghton Mifflin Co. - "The Energy Needs of a Community" (Life in a pond & coral reef)	X	X	X				
L. Supplemental Books 48. The Beachcombers Book - Viking Press (Short descriptions of various types of shells and shore animals)	X		X				
49. The Science Encyclopedia - Houghton-Mifflin Co. (One subject for each letter of the alphabet)	X		X	X	X		
50. How and Why Wonder Book of Fish - Wonder Books (Many questions asked ane then answered about fish)	X	X		X	X		
51. Monsters of the Sea; Scholastic Book Service (Short Chapters written on the more unusual marine animals)	X		X				
52. Whales and Dolphins, Educational Reading (Several short paragraphs dealing with the different types of whales and dolphins)	X		X				
53. The Lobster King - ODDO Publishing Co, (Ficticious story in animated form of a lobster's journey - factual descriptions of marine life)	X		X	X	X		X
54. Animal Encyclopedia - Houghton-Mifflin Co. (Alphabetical listing of various animals)	X		X	X	X		
55. Questions About the Oceans (U. S. Naval Oceanographic Office, approximatly 150 questions answered about the ocean)	X	X	X	X	X	X	X
56. Zoology - Golden Press (Surveys the general subject of zoology)	X	X	X				
57. Marine Science Field Trip - Educational Series I.O. Norfolk Va, or Science Resource Center, Hampton City Schools (Ideas for field trips in the tidewater area, very good drawings of marine organisms)	X		X				

MATERIALS LIST

Materials	Concepts						
	1	2	3	4	5	6	7
58. Knowing and Understanding (Series of books on various subjects including Fish, Reptiles and Amphibians, Mammals) Benefic Press (Question - answer format - very thorough treatment of subjects)	X	X	X	X	X	X	X
59. Newsweek Yearbook 1970 - Oceanography (Large portion of book deals with research and what man gets from the sea)				X	X	X	X
60. What is a Fish? Benefic Press, (Elementary level, basic facts on fish group)	X	X	X				
61. Pond Life - Golden Press (Discusses intertidal region as well as shore animals)	X	X	X		X		
62. Seashores - Golden Press (Most saltwater and freshwater species described)	X	X	X	X	X		
63. Fish - Golden Press - (Most saltwater and freshwater species described)	X	X	X	X	X		
64. Seashells - Golden Press - (Identifies most North American varieties of seashells)	X	X	X				
65. What is a Frog?, Scholastic Book Service, (Written at an elementary level, contains basic facts)	X	X	X				
66. Odd Pets, Scholastic Book Service, (Many pets described including the bullfrog)	X		X				
67. Pets from Wood Field and Stream, Golden Press, (Many animals described including pond animals)	X		X				
68. Fish Dangerous to Man (Several animals mentioned all harmful to man)							
M. Library Most students will get a chance to use the library for reports or free-reading. The following can be utilized: Book stacks Study Carrells containing Audio-Visual Equip. Magazine Section Reference Section							
N. Teacher-Made Learning Centers Each learning center should have complete directions for the student. Below is a brief description to explain the contents of each learning center. 69. Common Fish You Should Know - A matching exercise in which there are two columns, one containing the names of fish the other a fact or description.							

MATERIALS LIST

Materials	Concepts						
	1	2	3	4	5	6	7
70. How Does A Fish Swim? True-false questions utilizing a drawing and paragraph which answers the question.		X					
71. Fishy Adaptation - List various structures of a fish while observing a preserved specimen and using an anatomical drawing		X					
72. Fish In School - Student writes what the title of this learning center means to him. Then, using reference sources, the student is asked to find out what a school means and the advantages of this type of traveling.	X	X			X		
73. Foods From The Sea - Unscramble a group of letters that spell the name of a marine animal used for food. Then match up the name with a riddle.	X				X		
74. Fish And Other Animals. Given a set of facts about fish, amphibians and crustaceans group each fact under one or more columns entitled Fish, Amphibians, Crustaceans.	X	X	X				
75. Does The Fish Feel The Hook? The student is given a book in which the question is asked and answered. The index or table of contents is used to find the section.		X					
76. Things That Live In the Ocean and Lakes - Given is a group of animals and plants, each student decides if the organism lives in fresh or salt water, then puts the name in the appropriate column.	X						
77. Some Ways Sea Animals Get Food - Match up two columns - one including animals, the other their particular method of getting food. (Example - jellyfish - stinging cells)	X	X		X			
78. Dangerous Sea Life - True-false and short answer questions concerning some of the marine organisms harmful to man.	X				X		
79. Record - Breakers Of The Sea - Matching up the item with the record it holds.	X				X		
80. Are There Really Sea-monsters? - Match up the animal with the fact.	X						
81. Can You Read This Chart? - Group of study guide questions on the Smallwood charts.	X	X					

MATERIALS LIST

Materials	Concepts						
	1	2	3	4	5	6	7
82. Types Of Freshwater Communities - Unscramble groups of letters to spell out the names of fresh-water bodies (Example onpd = pond; ekla - lake)						X	
83. Plants Of The Freshwater Community - List of plants. Next to each name, the student is asked to record the location of the plant; ie, in or near a body of water.	X						X
84. Amphibian vs, Reptile - Group facts under one or both columns: Reptiles or Amphibians.	X	X	X				
85. Types Of Amphibians And Reptiles - List of animals, combination of both types. Next to each name, the student records R or A (for Reptile or Amphibian).	X						
86. The Life Cycle Of An Amphibian - Drawing of the stages of development of a frog are on poster board out of order. The student rearranges the stages in the correct order.	X	X					
87. Crustaceans vs. Insects And Spiders - Group of facts about all three. Student arranges facts under the proper column.	X	X	X				
88. Types of Crustaceans - Unscramble groups of letters to spell out different types of crustaceans.	X						
89. Dissection Chart - Descriptions and facts are given about animals which the student has prevously dissected. The student is asked to group facts under the proper column. (Animals: frog, fish, crayfish, clam, starfish)	X	X	X				
90. Plants And Animals Of A Freshwater Community - True-false questions concerning freshwater inhabitants	X	X	X				
O. General Materials 91. Overhead projector	X	X	X	X	X	X	X
92. Distillation unit			X	X			
93. Microscopes	X						
94. Aquarium set-up		X					
95. Packet of Sea-monkies	X						
96. Dissecting equipment		X					

MATERIALS LIST

Materials	Concepts						
	1	2	3	4	5	6	7
97. Specimens for dissecting - fish. shark, crayfish, starfish, clam, frog		X					
98. Sea-Shell Collection	X						
99. Teacher - made puzzles	X						
100. Dissection Notebook which contains an explaination of how to dissect each animal and study guide questions for each animal.	X	X					
101. Art supplies	X	X	X				
102. Teacher - Made Study guides. Small groups of questions on various topics (Biology I & II)	X	X	X	X	X	X	X
103. Duplicated materials on various topics (Biology I and II) Continental Press -	X	X	X	X	X	X	X

Students and teacher - directed activities are keyed to the materials and the concepts.

ACTIVITIES

Activity	Materials	Concepts 1	2	3	4	5	6	7
1 Common Fish You Should Know - Learning Center #One	63 & 69	X						
2 How Does a Fish Swim? - Learning Center #Two	58 & 70		X					
3 Fishy Adaptations - Learning Center #Three	45 & 71		X					
4 Fish In School - Learning Center #Four	63 & 72	X	X			X		
5 Foods From the Sea - Learning Center #Five	62 & 73	X				X		
6 Fish and Other Animals - Learning Center #Six	56 & 74	X	X	X				
7 Does the Fish Feel the Hook? - Learning Center #Seven	58 & 75		X					
8 Things That Live In the Ocean and Lakes - Learning Center #Eight	61,62 & 76	X						
9 Some Ways Sea Animals Get Food - Learning Center #Nine	44 & 77	X	X		X			
10 Dangerous Sea Life - Learning Center #Ten	68 & 78	X				X		
11 Record - Breakers of the Sea - Learning Center #11	79	X				X		
12 Are There Really Sea-monsters? L. C. #12	51 & 80	X						
13 Can You Read This Chart? L. C. #13	1,2,3,4,5,6 & 81	X	X					
14 Study the preserved specimen of a Lamprey eel. Look up the lamprey eel in the How and Why Wonder Book of Fish. How did this animal effect the other fish of the Great Lakes? How did it get there?	50	X	X	X	X	X		
15 Using the table of contents, find the sections on bonyfish and cartilaginous fish in Life: Its Forms and Changes. Record 5 facts about each kind of fish. Compare the two lists, what do they have in common? What is different?	45	X	X	X				
16 Study the set of preserved water animals. Using the book provided, identify the animals.	97,62 & 64	X						

Activity	Materials	Concepts						
		1	2	3	4	5	6	7
17 Read and answer the question for the booklet titled "Seahorse". Draw a chart showing the different ocean zones.	19				X		X	
18 Join the class in discussing the adaptations of a flounder while studying a preserved specimen.	97	X	X	X				
19 With your teacher's help discover how to set up and maintain an aquarium.	94	X	X					
20 After watching the film, "Shell - fishing in the Chesapeake Bay", Write a list of the animals mentioned in the film.	38	X					X	
21 At the library, write a report from the list of possibilities provided.	M	X	X	X	X	X	X	X
22 View the film loops dealing with - the ocean. For each loop write one new word discovered while watching the film and write the definition.	39,40, 41, 42 & 43						X	X
23 Read the SRA cards on the Salmon. Answer the questions on the back and the draw a picture showing the steps of processing salmon.	22 & 24	X				X		
24 Observe the teacher demonstrate how water can be separated from salt. Draw the instrument that separates water and solids. Write the definition of distillation.	92					X	X	
25 Read pages 133 and 134 in Pathways in Science Earth Science II. Answer these 2 questions: "How did the oceans become salty?" and "What chemicals are dissolved in seawater?"	16						X	X
26 Carry out the experiment found on page 25, Life: Its Forms and Changes. Write down the 5 steps to this experiment. Draw two pictures; one before salt is added, one after.	93 & 45						X	
27 Read paragraph 2, page 141, Pathways in Science II, Physics.Answer these questions: Why does a ship float? When does a ship sink?	17							X
28 Answer all question for chapter 5 and 6 Pathways in Science Biology II, Unit IV after completing a DRTA for each chapter.	16	X	X	X				

ACTIVITIES

Activity	Materials	Concepts						
		1	2	3	4	5	6	7
29 Read and answer the questions for "Life Cycle of a Fish" Pathways in Science Biology III. When this is completed draw the life cycle of the fish.	14	X	X	X				
30 Study and complete the questions for the SRA "Water Cycle"	21							X
31 Go to the Readers Digest Book Rack. Choose an article from the list. Read the article and complete the study guide that goes with it.	7,8,9,10,11, 12 & 13	X	X	X	X	X	X	X
32 Observe the animals and plants in the classroom aquarium. Pick one or more animals and describe them. Also mention, if you discover how the animals move, eat, and protect themselves.	94	X	X	X	X			
33 Join the class in trying to grow some sea monkies. Use the microscope and try to discover what "sea monkies" really are.	93 & 95	X		X				
34 View the film "plankton-pastures of the ocean". Following the film, join the class in drawing the basic food chain of the ocean.	37	X			X			
35 Work with your group in completing the Dissection Notebook on water animals.	100,96 & 97	X	X					
36 Identify the unknowns of the classroom sea-shell collection.	64	X						
37 Work with the jumble word puzzle, "Things of the Sea."	99	X	X	X	X	X	X	
38 Complete stencils dealing with water animals and plants.	103	X	X	X		X		
39 Join the class in working with, Life Science. Unit Five, DRTA, Discussion, Dissection	46	X	X					
40 Types of Freshwater Communties, - L. C. #14	82						X	
41 Plants of the Freshwater Community - L. C. #15	83 & 61	X					X	
42 Amphibian vs. Reptiles - L. C. #16	84 & 58	X	X	X				

ACTIVITIES

Activity	Materials	Concepts						
		1	2	3	4	5	6	7
43 Types of Amphibians and Reptiles, L. C. #17	85 & 58	X						
44 Life Cycle of an Amphibian - L. C. #18	86 & 65	X	X					
45 Crustaceans vs. Insects and Spiders, L. C. #19	87 & 56	X	X	X				
46 Types of Crustaceans L. C. #20	88 & 56	X						
47 Dissection Chart L. C. #21	89	X	X	X				
48 Plants and Animals of a Freshwater Community L. C. #22	90	X	X	X				
49 Draw the Steps of the Frog's Life Cycle	6		X					
50 View the film "The Sea" List four different animals seen in the film.	36	X			X	X		
51 Before dissecting the frog, join the class in viewing the slides on the frog.	34		X					
52 Before dissecting the crayfish join the class in viewing slides on the crayfish,	33		X					
53 Read "The Life Cycle of Frogs and Reptiles" Pathways in Science Biology Book 3, page 80. Answer the questions at the end of the chapter.	15	X	X					
54 Use Pathways in Science, Earth Science II, Unit IV, Chapter Four.: Answer these questions What are currents caused by?, What are tides caused by?	16							X
55 DRTA - The Water Cycle Pathways in Science Chemistry II. Answer the questions at the end of the chapter.	18						X	X
56 Read the SRA card entitled "Sea Cycles" Answer the questions on the reverse side.	20				X			
57 After studying the SRA card entitled "How Water Is Purified", draw a diagram to explain the process of purification.	23						X	
58 From the list of filmstrips pick one or two. View the filmstrip and the complete the study guide for that filmstrip.	25,26,27,28, 29,30,31 & 103	X	X	X	X	X		
59 View the slides "Sea Life". Draw the Structured Overview on the Marine Community.	32	X	X	X	X	X	X	X

ACTIVITIES

Activity	Materials	Concepts						
		1	2	3	4	5	6	7
60 Before dissecting the Starfish, join a class discussion on the animals anatomy.	35		X					
61 Join a class discussion on food chains in a pond community. Use the drawing on page 187 Man and the Environment. Use the drawing on page 189 to make up two food chains of your own.	47	X			X			
62 Choose a book at the Reading Corner. Read any part and record the title and page numbers in your notebook.	48,49,52, 53,54,55, 57,59,60, 65,66,67	X	X	X	X	X	X	X

LAND COMMUNITIES

By
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Life Science Teacher
Thorpe Junior High School

CONCEPTS FOR EMPHASIS

The student will be able to:

1. Demonstrate a knowledge of the basic land communities of North America, the various stages of the communities and characteristic plants and animals.
2. Develop an understanding of the energy flow in land communities.
3. Demonstrate an understanding of the basic principles of botany.
4. Demonstrate his understanding of the basic land animal groups.
5. Demonstrate an understanding in the methods used to study land communities.

The books and materials listed on the following pages are keyed to the concepts and objectives which will be emphasized in this unit.

Materials List	Concepts				
	1	2	3	4	5
1. Transparencies-"Zones of Life", Earth Corps Ecology, Scholastic Book Company, Conservation Units 2 and 3. These transparencies include in color, scenes from the various types of land communities.		X			
2. Preserving apparatus including embedding kit, alcohol or formolin jars, plant press.					X
3. "Wildlife in Virginia", film. This film discusses the forest community. It shows all types of wildlife from the various phyla.	X	X	X	X	
4. Flowers-Golden Press-(A guide to the common flowers of North America)			X		
5. Trees-Golden Press-(A guide to the common trees of North America)			X		
6. "How a Tree Functions", (Learning Center). Students answer a set of questions while studying the chart entitled "How Trees Grow"--American Forest Products, Inc.			X		
7. The World of Living Things, General Textbook (7th grade reading level)	X	X	X	X	X
8. Study Guide on Trees-This is a teacher-made activity. List two columns, one having the names of ten trees found near school, the other having a characteristic for each tree listed in Column I. Have students match the ten trees and their characteristics.			X		
9. Exploring and Understanding Plant Structure (Benefic Press) The format of this kit is question/answer.			X		
10. "Plant System" (Knowledge Aid Tapes) This is a set of tapes and study guides on plant structure and function--photosynthesis, root systems, vascular system, respiration.			X		
11. Animal and Plant Crossword Puzzles, (Mattel Co.) Subjects included in this set of puzzles are plants, parts, types of vegetables, plants around the house, zoo animals, domestic animals, wild animals, and pets.			X	X	
12. "Life in the Forest"-film. The subject of this film is the various types of food chains.		X	X	X	
13. Study guide entitled, "Life in the Forest" (Teacher-made concept guide)		X	X	X	
14. "Types of Trees" (Learning Center) The student is given 20 strips of cardboard each of which has a description of a tree, (example:"has needle-like leaves") The student places each strip in one of five pockets. Each pocket is labeled with the name of a tree. Use: Junior Science Book of Trees-Garrard Publishing Co.			X		

Materials List	Concepts				
	1	2	3	4	5
15. Filmstrips and Study Guides. From the school library 10 filmstrips were chosen. Each was viewed and a study guide of questions were written, (concept guides). On 3 X 5 cards the name and a description were completed and placed in a file. The study guides, card file and previewer were placed on a separate table in the room.	X	X	X	X	X
16. "The Living Library" Reports written or taped by students are placed in a central location. These reports can then be utilized as reference sources for the entire class. Topics chosen by the teacher should vary in length, degree of difficulty, and materials on hand. Students should be encouraged to use the library--particularly the card catalogue.	X	X	X	X	X
17. "Nature's Half Acre", film. (ERC-Hampton City Schools) This film is entertaining, informative and not technical.	X	X	X	X	
18. "Beaver Valley", film. (ERC-Hampton City Schools) Not technical.	X	X	X	X	
19. Materials: net, pins, cardboard, moth balls, ether, jar, cotton.					X
20. Prepared slides: Compass Co. "Insect Parts" Slides include eye, leg, antennae, wing, mouth.				X	
21. Grasshopper (Specimens) Biological (Instructions and questions on dissection of grasshopper is provided by the teacher)				X	
22. "The Tundra" "Glaciers"--Filmloops, H. W. Thorpe Jr. High Library. Physical descriptions of each.	X				
23. Preserved rabbit - Carolina Biological				X	
24. Set of standard school dictionaries.	X	X	X	X	X
25. Transparencies--Nitrogen, Carbon cycles (Carolina Biological) These transparencies illustrate each cycle.		X			
26. Preserved snake - Carolina Biological				X	
27. All About the Insect World, Random House. This book contains short articles about different topics. Very good coverage of all topics.	X	X		X	X
28. A variety of preserved specimens in jars. Carolina Biological				X	
29. Insects, Golden Press. (A guide to insects common in North America)	X			X	X
30. What do you want to know about Earthworms? Scholastic Book Services--Format is question and answer. The book is clean-cut and factual.		X		X	X
31. Preserved Earthworms--Carolina Biological				X	

Materials List	Concepts				
	1	2	3	4	5
32. *Life: Its Forms and Changes*-Basic text, good reference.	X	X	X	X	X
33. *Plants, Animals and Us*-About 15 articles including the fundamental principles of Zoology.	X	X		X	X
34. *Life Science*, Ginn & Co. (Problem solving approach to 7th grade science)	X	X	X	X	X
35. "Structure of a Butterfly" (Learning Center) Student answers a set of questions while examining a drawing of a butterfly. He is then instructed to study a living and preserved butterfly.				X	
36. "Metamorphosis of a Moth" (Learning Center) Student answers a set of questions while examining a chart showing the steps of metamorphosis.				X	
37. "Bee and Ants" (Learning Center) Use a large drawing showing the structure of ants and bees, also use preserved specimens. The teacher tapes a narrative about the structure of these insects. The student completes a concept guide utilizing the sources mentioned above.		X		X	
38. "Fungus--Plant or Animal?" (Learning Center) Specimen of a typical fungus such as a mushroom is used. Students examine the mushroom, read an article about fungi, and then answer true - false questions. *Toadstools and Such*, Steck-Vaughn, Co.		X		X	
39. "Is This a type of Mushroom?" (Learning Center) This is an activity of classifying a type of fungus. It follows the scheme of starting with major groupings and ending with specific species. At each step the student is given two choices of the correct group. *Non-Flowering Plants*, Golden Press.		X	X		
40. "Divide These Plants Into Two Groups" (Learning Center) Several specimens of plants are given. The student is asked to put the name of the plant (also given) into one of two columns: Non-Flowering Plant or Flowering Plant. *Non-Flowering Plants* and *Flowers*, Golden Press.		X	X		
41. "Insects-Crustaceans-Spiders" (Learning Center) Concept guide. The student takes a group of facts and puts the facts under appropriate columns. *Spiders*, *Crustaceans*, *Insects* - Golden Press.		X		X	
42. "Carnivore vs. Herbivore" (Learning Center) Evaluative center. Student answers some true - false questions without the use of books.				X	
43. "Reptile Names" (Learning Center) This center includes a set of preserved specimens (Carolina Biological), which are not labeled. Given a list of common names the student matches the names with the specimens in the jars. *Reptiles and Amphibians* - Golden Press.				X	

Materials List	Concepts 1	2	3	4	5
44. "Plant Parts" (Learning Center) Evaluative center. A large drawing of a flower with markers as to important flower structures. The student determines what the structure of the drawn flower is and then matches the name (a list is given) to its function (also given).			X		
45. "Mammals" (Learning Center) From a large group of photographs the student determines the name of the animal. He then decides in what type of community that animal lives. Zoos - Golden Press.	X			X	
46. "How To Use A Snake Bite Kit" (Learning Center) A snake bite kit is provided. The student studies the instructions and then acts through the motions of performing the first aid.				X	X
47. "Pick a Bird" (Learning Center) From a group of photographs a student picks one bird. He then finds information on the bird and writes a story about it. Birds - Golden Press.				X	
48. "Common Insect That Bite and Sting" (Learning Center) Exerpts are used from an article found in Medical Symposium on this subject. The student reads part of the article and answers questions in the form of a Three Level Study Guide.				X	
49. "Match Up the Leaves On the Tree" (Learning Center) Press leaves from ten common trees. From a list of trees the student decides which leaf belongs to which tree. Trees - Golden Press.			X		
50. "How Plants Move Seeds" (Learning Center) The student uses a Turtox Classroom Chart entitled "Transportation of Seeds" to answer a set of teacher-made questions.			X		
51. "The Conquest of Insects" (Learning Center) A commercial chart is used by the students as a reference in answering certain questions which are in the form of a concept guide. The chart comes from Golden Crest Protection, Inc.				X	X
52. "Don't Let Them Bug You" (Learning Center) Use a set of microphotographs of the stinging and sucking apparatus of common insects, (Natural History Magazine, Sept. 1973) The student tries to match up each photograph with name of the insect. Insects - Golden Press.				X	
53. "Birds-Mammals-Reptiles" (Learning Center) This is a concept guide involving facts about these three animal groups.				X	
54. "How Much Do You Know About Snakes?" (Learning Center) The student uses a booklet on common snakes to answer true - false questions. Snakes - Educational Services. - A flip-out booklet with a picture and short paragraph about twenty snakes.				X	

Materials List	Concepts				
	1	2	3	4	5
55. "How Deserts Are Formed" A large drawing is used which illustrates why deserts are found near mountain ranges. The student uses this chart and the text to answer questions. The text used is Life: Its Forms and Changes.	X	X			
56. "Dangerous Snakes" (Learning Center) Preserved specimens of the Copperhead, Rattlesnake, and Cottonmouth are used as well as a book on snakes. The student uses these to answer true - false questions. Snakes and Other Reptiles - Golden Press.				X	
57. "Grasslands vs. Forests" (Learning Center) A concept guide on these two communities.	X				

The activities listed on the following pages are keyed to the concepts and the materials.

Activities	Concepts					
	Materials	1	2	3	4	5
1. Today we will discuss the structured overview "Land Communities". After the discussion please draw in your notebook this structured overview.	1	X				
2. Following a structured overview and discussion list the ways living things can be preserved.	2					X
3. View the film "Wildlife in Virginia". Complete the study guide. (Teacher: This study guide is included within this unit.)	3	X	X	X	X	
4. Join the class on a field trip to identify and press plants found near school.	2,4,5			X		
5. "How a Tree Functions" (Learning Center #1)	6			X		
6. Read the paragraph on cone-bearing trees, p. 97, The World of Living Things. Write down five facts about cone-bearing trees.	7	X		X		
7. Join the class in identifying trees without the use of books.	8			X		
8. Draw and then study two pictures--one of a leaf and the other a flower. When you know the names of the different parts ask the teacher to quiz you. Model drawings may be found on pages 19 and 53 in Exploring and Understanding Plant Structure.	9			X		
9. After listening to the tapes on "Plant Systems" complete the study guide.	10			X		
10. Complete the animal and plant crossword puzzles.	11			X	X	
11. View the film "Life in the Forest" - Complete the study guide.	12,13		X	X	X	
12. "Types of Trees" (Learning Center #2)	14			X		
13. Go to the filmstrip catalog and select one or two filmstrips that interest you. Then pick up the correct study guide. View the filmstrip and complete the study guide.	15	X	X	X	X	X
14. Choose a topic for a report from the list given. Use the library book rack, or a filmstrip to complete the report. When the report has been checked over by your teacher, draw pictures to illustrate the article. Then tape or type the report and hang it up at the Living Library Bulletin Board.	16	X	X	X	X	X
15. View the film "Nature's Half Acre".	17	X	X	X	X	
16. View the film "Beaver Valley".	18	X	X	X	X	

Activities	Materials	Concepts				
		1	2	3	4	5
17. Discover how to set up an insect collection. Your teacher will aid you in constructing a structured overview on setting up an insect collection.	19					X
18. Using the microscope and prepared slides, draw and label the various parts of an insect.	20				X	
19. Dissect and study the Grasshopper.	21				X	
20. As outside work at home make up an insect collection with at least 5 types.					X	
21. View the filmloops "The Tundra" and "Glaciers".	22	X				
22. With your teacher study the various structures of the rabbit. You will construct a structured overview in your study.					X	
23. Without using a book, make-up 3 things an animal must have to live in the desert. Do the same thing for animals which live in the Arctic. Compare your lists.		X				
24. Draw and label the "Energy Pyramid". (Structured Overview) Use the dictionary to look up the words used in the "Energy Pyramid". Are the definitions in the dictionary and the teacher's definitions the same for each word.	24		X			
25. Draw and label the "Cycles of Life". If the teacher gives a meaning for some words, write the meaning down.	25		X			
26. Discover what "nocturnal" means. What sense organs need to be sharpened if an animal is nocturnal? "What advantages would a nocturnal animal have in the desert? After finding the meaning of nocturnal, try to answer the remaining questions on your own.	24		X		X	
27. Observe and study the structures of a snake. (Teacher-directed lecture and discussion)	26				X	
28. Read the section entitled "An Insect's Curious Life Cycle" in All About the Insect World. Answer these questions: What does metamorphosis mean? What kind of animal goes through metamorphosis? Draw the life cycle of one of these animals.	27				X	
29. Group some jars of preserved insects. After the jars are in about four groups write a description of each group. The description should include the name of the insects in each group and two things the insects have in common. Use the book Insects to identify the specimens.	28,29				X	
30. Look up "desert" and "grassland" in the index of The World of Living Things. Write down 5 facts about each type of community. Compare the list, what do they have in common?	7	X				

Activities	Materials	Concepts				
		1	2	3	4	5
31. Turn to the table of contents in the book What Do You Want to Know About Earthworms? There are nine questions asked about worms. Pick 3 of these and write them on your paper. Now answer the three questions.	30		X		X	X
32. Dissect and study the Earthworm. Use Life: Its Forms and Changes, pp. 344-345. As a group, answer the questions on p. 345.	31,32				X	
33. Write down three facts about Reptiles, Mammals, and Birds. Compare the list. In a separate column, using your lists, write down what all three animal groups have in common. Use Plants, Animals and Us, pp. 9, 14, and 22.	33				X	
34. Read pp. 354-356 in Life Science. After reading define these two words--producer and consumer.	34	X	X			
35. Write the definitions for the following words while listening to a class discussion on "Community Relationships": predator and prey, parasite and host, consumer and producer.			X			
36. Make a list of what you have eaten in the past 24 hrs. Next to each food item write down the type of animal from which it comes.(producer, consumer, scavenger, or decomposer) If you are unsure of these terms refer to Activity 24.			X			
37. Complete Unit IV: "Plant Structures and Function", Life Science. Complete the activities for each chapter.	34	X	X	X		X
38. "Structure of a Butterfly" (Learning Center 3)	35				X	
39. "Metamorphosis of a Moth" (Learning Center 4)	36				X	
40. "Bees and Ants--The Social Insects" (Learning Center 5)	37		X		X	
41. "Fungus--Plant or Animal?" (Learning Center 6)	38		X	X		
42. "Is This a Type of Mushroom?" (Learning Center 7)	39		X	X		
43. "Divide These Plants into Two Groups" (Learning Center 8)	40		X	X		
44. "Insects-Crustaceans-Spiders" (Learning Center 9)	41		X		X	
45. "Carnivore vs. Herbivore" (Learning Center 10)	42				X	
46. "Reptile Names" (Learning Center 11)	43				X	
47. "Plant Parts" (Learning Center 12)	44			X		
48. "Mammals" (Learning Center 13)	45	X			X	

Activities	Materials	Concepts 1	2	3	4	5
49. "How to Use a Snake Bite Kit" (Learning Center 14)	46				X	X
50. "Pick a Bird" (Learning Center 15)	47				X	
51. "Common Insects That Bite and Sting" (Learning Center 16)	48				X	
52. "Match up the Leaves on the Tree" (Learning Center 17)	49			X		
53. "How Plants Move Seeds" (Learning Center 18	50			X		
54. "Don't Let Them Bug You?" (Learning Center 19)	52				X	
55. "Birds, Mammals, Reptiles" (Learning Center 20)	53				X	
56. "How Much Do You Know About Snakes?" (Learning Center 21)	54				X	
57. "How Deserts Are Formed" (Learning Center 22)	55	X	X		X	
58. "Dangerous Snakes" (Learning Center 23)	56				X	
59. "Grasslands vs. Forest" (Learning Center 24)	57	X				

Wildlife in Virginia

A Study Guide

Level I (Factual) Check those statements which are true.

_____ Chipmunks are protected by their color.

_____ The largest rodent is the beaver.

_____ Minks are fairly common in Virginia.

_____ Raccoons are dirty animals.

_____ The largest animal in Virginia is the Elk.

_____ The way to tell a male and female deer apart is by looking at the hoofs.

_____ Black bears are a very large type of bear.

_____ Possums are very attractive animals.

Level II (Interpretive) Check those items which are correct interpretations of what you have seen and heard in the film.

_____ There is a great deal of difference between a squirrel and a chipmunk.

_____ People have never had any use for the beaver.

_____ Deer were very important to the American Indian.

_____ A rabbit's main enemy is the snake.

_____ Bobcats are fairly small animals.

Level III (Applied) Which of the following statement best express the meaning of the film.

_____ Bears cannot stand on two legs.

_____ If your work is compared to a beaver's, you have been insulted.

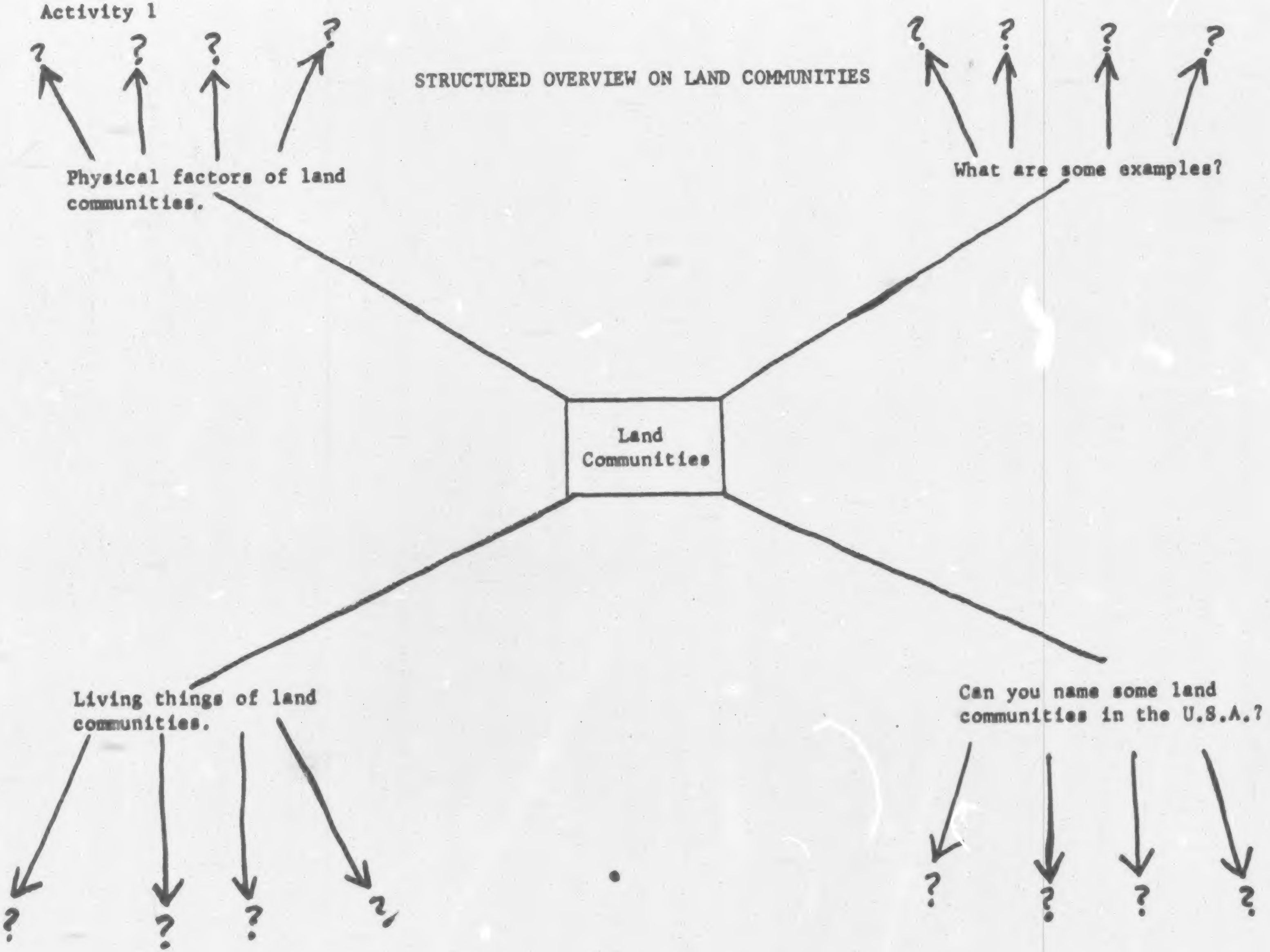
_____ Bears have good smell because they have poor eyesight.

_____ People should stop worrying about forest fires, we still have plenty of woods left.

_____ Wild animals as seen in this film are of no use since we don't eat them very often.

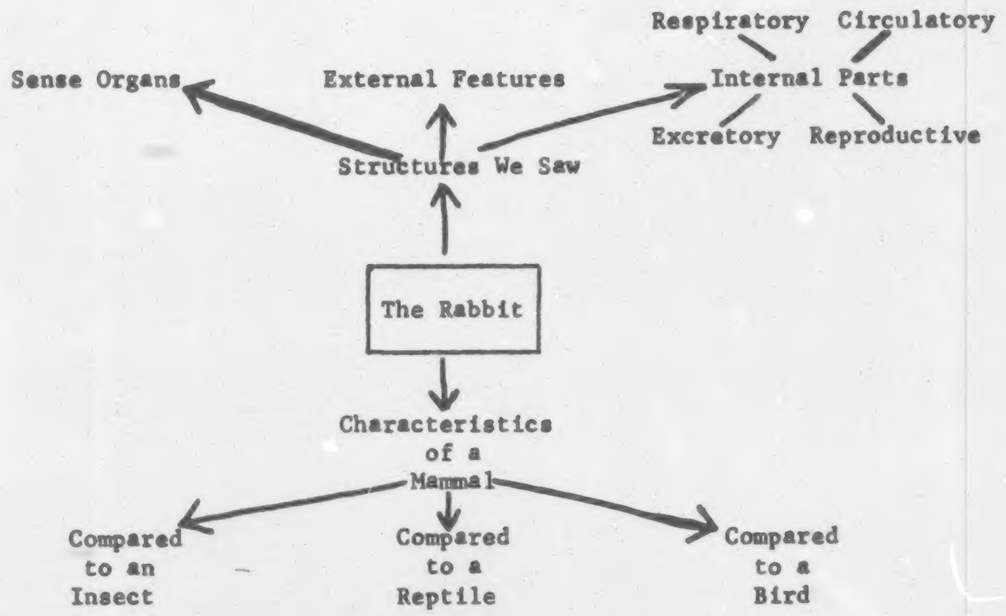
Activity 1

STRUCTURED OVERVIEW ON LAND COMMUNITIES


?
?
?
?
Physical factors of land communities.
?
?
?
?
What are some examples?
Land Communities
Living things of land communities.
?
?
?
?
Can you name some land communities in the U.S.A.?
?
?
?
?

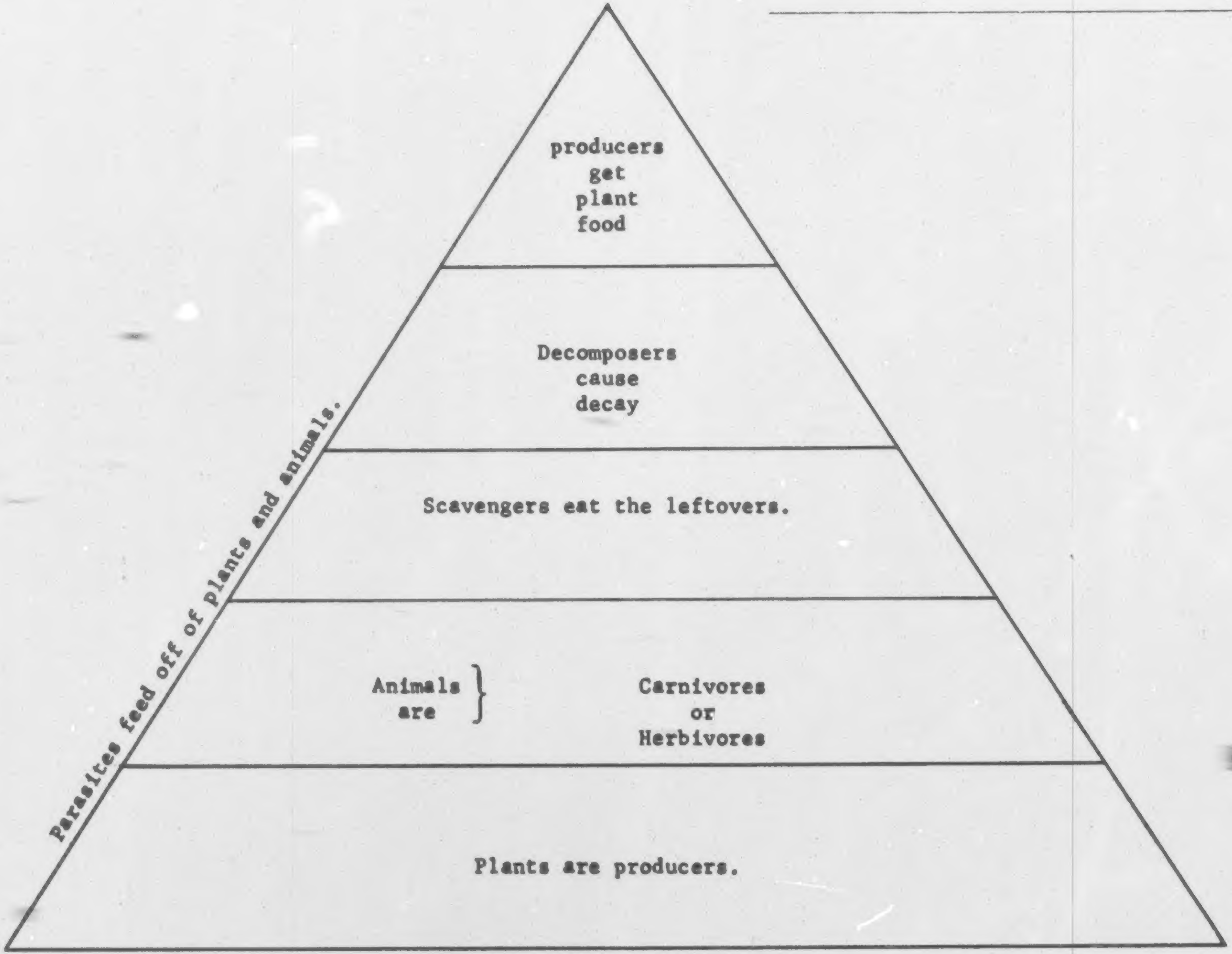
Activity 22

STRUCTURED OVERVIEW - THE RABBIT


Respiratory
Circulatory
Sense Organs
External Features
Internal Parts
Excretory
Reproductive
Structures We Saw
The Rabbit
Characteristics of a Mammal
Compared to an Insect
Compared to a Reptile
Compared to a Bird

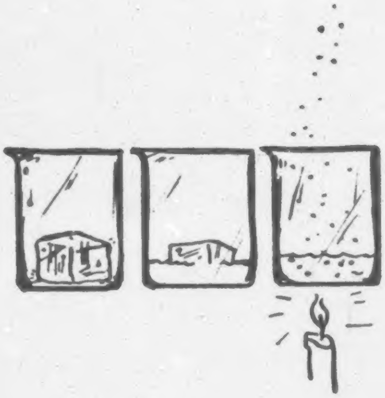
Activity 24

ENERGY PYRAMID


producers get plant food
Decomposers cause decay
Scavengers eat the leftovers.
Animals are
Carnivores or Herbivores
Plants are producers.
Parasites feed off of plants and animals.

The Three States Of Matter

A Unit of Study for Physical Science



by

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Unit of Study

The Three States Of Matter

I. Unit Outline
    A. Concepts for emphasis
    B. Activity key

II. Learning Center Activities

III. Laboratory Experiments

IV. Structured Overview

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The Three States Of Matter

Unit Outline

Concepts for emphasis

The students will:

1. define matter as anything that has weight and takes up space.
2. distinguish between the three states of matter (solids, liquids, and gases)
3. understand that all matter is made up of atoms, of which there are more than 100 different kinds
4. understand that atoms can join together to form molecules, which are the smallest particles of a substance having all the properties of that substance
5. understand that the freedom with which the molecules of a substance can move determine its state.

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The books and materials listed on the following pages are keyed to the concepts and objectives which will be emphasized in this unit.

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Materials (Books & Films)	Concepts				
	1	2	3	4	5
1. The ABC's of Chemistry, Gallant, Kay (Doubleday) This is a reference book containing thousands of basic facts about chemistry.	X	X	X	X	
2. What is Matter?, Munch, Theodore (Benefic) This book gives an understanding of basic concepts and facts of matter.	X	X	X		
3. Inside the Atom, Asimov, Isaac (Abelord) This is a book that describes the structure of atoms.			X	X	
4. Matter, Earth and Sky, Gamow, George (Prentice) This book discusses matter and how it is the basis of all things.	X				
5. Molecules Today and Tomorrow, Hyde, Margaret (McGraw) This book gives basic facts about the molecule.				X	X
6. The Atom. Thomson, George (Oxford Univ. Press) This book discusses the structure and function of the atom			X	X	
7. Probing Into Science, Jacobson, Gillard & Lauby, Cecilia (American) This is a reference book containing many basic facts about chemistry and physics.	X	X	X	X	X
8. "Chemistry" Gateway This film describes everyday examples of chemical changes.	X	X			
9. "Solids, Liquids, and Gases" Young American Series. This film discusses the three forms of matter.		X			X
10. "Wonder of Chemistry" Young American Series, This film tells about elements and compounds and how their study forms the basis of the science of chemistry.			X		
11. "What Things are Made of" SVE, This filmstrip discusses the three states of matter, their properties, and how they differ.	X	X			X
12. "Atoms and Molecules" SVE, This filmstrip tells about atoms and molecules and how they form compounds.				X	X

Student and teacher-directed activities are keyed to the materials and the concepts.

Activities	Materials	Concepts 1	2	3	4	5
1. Observe the filmstrip "What Things are Made of". There will be a small group discussion on the filmstrip followed by the completion of the structured overview.	11		X		X	X
2. Learning Center 1: Identify pictures representing the states of matter.	2, 4, 8, 11		X			
3. On a table in the room you will find some objects. Identify as many as youcan.	2, 9, 11		X			
4. As a homework assignment, make a list of 6 items for each state of matter.	2, 9, 11		X			
5. Learning Center 2: Prove scientifically that these items represent matter.	2, 11	X				
6. List the physical properties of the items in learning center activity 2.	2, 11				X	
7. On a table in the room you will find some items. Identify as many as you can using physical properties.	2, 4, 11				X	
8. Look up the meaning of hard, soft, tough and brittle. Identify physical properties of glass, nail and talc.	2, 11				X	
9. Experiment 1: Is Air Matter?	2, 4	X				
10. Answer questions from the experiment "Is Air Matter?"	2, 4	X				
11. Name various objects that you see about the classroom and tell whether or not they are solids.	1, 2, 4		X			
12. Answer this question: Is describing a liquid as something that will make you wet, a good definition? Prove your answer.	1, 2		X			
13. List as many liquids as you can and tell whether any liquid that you have listed ever changes state.	1, 2, 4		X			
14. Experiment 2: Is Air a Gas?	2, 4		X			
15. Answer questions from the experiment "Is Air a Gas?"	2, 4		X			
16. Answer this question: How does a material diffuse through air?	1, 2, 4		X			
17. Learning Center 3: Constructing models of the H_2O molecule.	2, 3, 4, 12				X	

Activities	Materials	Concepts				
		1	2	3	4	6
18. Look up dirigibles.	1, 2, 4		X			
19. Learning Center 4: Constructing models of O_2 and H_2O molecules. Compare them.	2, 3, 4, 12				X	
20. Experiment 3: How can you see the results of the movement of water molecules?	1, 2, 4				X	X
21. Answer questions from the experiment "How can you see the results of the movement of water molecules?"	1, 2, 4				X	X
22. Experiment 4: How can you observe that molecules of gases move about freely?	2, 4, 7, 8		X			X
23. Answer questions from the experiment "How can you observe that molecules of gases move about freely?"	2, 4, 7, 8		X			X
24. Experiment 5: How can you see the results of molecular motion in liquids?	2, 7, 8		X			X
25. Answer questions from the experiment "How can you see the results of molecular motion in liquids?"	2, 7, 8		X			X
26. Experiment 6: How can you demonstrate the movement of molecules?	2, 7, 8, 9		X			X
27. Answer questions from the experiment "How can you demonstrate the movement of molecules?"	2, 7, 8, 9		X			X
28. Look up the process of sublimation and explain it to the class.	1, 2		X		X	X
29. Bring a piece of dry ice to class to show that dry ice when left in the air, will sublime, or change directly from a solid state to a vapor state.	1, 2, 8		X		X	XX

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Learning Center 1: Identifying Pictures Representing The States of Matter

Materials Needed:

Construction paper
Magazines
Glue
Scissors
Magic markers
Rulers

Procedure:

Select some pictures representing the three states of matter. Cut out the pictures and glue them on the construction paper. Under each of the pictures list the states of matter represented.

Learning Center 2: Prove Scientifically That These Items Represent Matter

Materials Needed:

Beaker of water
Empty glass
Air filled balloon
Iron nail
Aluminum foil
Jello
Silver spoon
Salt
Copper wire
Beaker of cooking oil

Procedure:

On the table you will find various objects. Carefully, look at each of the objects. Take each object and decide whether or not each one represents a form of matter. This can be done by remembering the properties or characteristics of matter After you have made your decisions, write down the name of each item and tell why you feel that it does or does not represent some form of matter.

Learning Center 3: Construction Models of The H_2O Molecules

Materials Needed:

Modeling clay (different colors)
Toothpicks

Learning Center 3 continued

Procedure:

Use different colors of modeling clay. Roll the clay into small balls. Toothpicks are to be used to hold the balls together. Construct the models by joining two balls of hydrogen to one of oxygen. Remove one of the hydrogen atoms; Are either of the two parts a molecule of water? What would happen if another atom of oxygen were added (H-O-O-H)? Is this water?

Remember: Water molecules can only be written as H-O-H with nothing added or taken away.

Learning Center 4: Constructing Models of O_2 and H_2O Molecules

Materials Needed:

Modeling clay (different colors)
Toothpicks

Procedure:

Use different colors of modeling clay. Rollthe clay into small balls. Toothpicks are to be used to hold the balls together. Construct the models (oxygen by joining two balls of the same color with toothpicks) and (water by joining two balls of hydrogen to one of oxygen). Look at the two constructions, how do they differ? How are they alike?

Experiment 1: Is Air Matter?

Materials Needed:

1 glass
1 piece of paper
1 pail of water

Procedure:

Take a glass and place a piece of dry crumpled paper in the bottom of it, wedge in so that it will not fall out when the glass is inverted. Plunge the inverted glass into a pail of water till the glass is fully covered.

Questions:

Did the paper get wet? Why?

Experiment 2: Is Air A Gas?

Materials Needed:

balloons (different shapes and sizes)

Experiment 2 continued

Procedure:

Blow up the balloons. The greater the variety in shape and size, the better. Look at the balloons after they have been blown up. Try to find portions of the balloons in which there is no air.

Questions:

1. Did you find any portions in which there was no air?
2. Does the air fill its container?
3. Does the air take the shape of its container?

Experiment 3: How Can You See The Results Of The Movement Of Water Molecules?

Materials Needed:

Microscope
Microscope slide
Pen
Water
India ink

Procedure:

Place a drop of water on the microscope slidd. Then dip only the tip of your pen into the India ink. Next put the tip of the pen in the drop of water on the microscope slide. Get as little ink in the water as you can.

Carefully place the slide, with the drop of water and the ink, on the microscope. Focus the microscope on the drop. Observe the ink in the water. The motion that you see is caused by molecules of water striking the tiny particles of ink.

Questions:

1. Do you see the particles of ink move?
2. Can you describe the movement?
3. Do you think that the molecules of water are moving very rapidly or very slowly? Why?

Experiment 4: How Can You Observe That Molecules Of Gases Move About Freely?

Materials Needed:

ammonia
flat dish

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Experiment 4 continued

Procedure:

While you stand at one end of a room, have someone at the other end of the room pour a little ammonia into the dish.

The molecules of the ammonia mix with the molecules of the air.

Question:

How much time passes before the odor of the ammonia reaches you?

Experiment 5: How Can You See The Results Of Molecules Motion In Liquids?

Materials Needed:

glass
water
vegetable coloring

Procedure:

Fill the glass with water. Put the glass of water in a place where you can let it stand for three days.

One hour after you filled the glass with water, slowly add a drop of vegetable coloring. Without moving the mixture, observe what happens over a three-day period.

Question:

Do you see how water and vegetable coloring are slowly mixed?

Experiment 6: How Can You Demonstrate The Movement Of Molecules?

Materials Needed:

marbles
small, flat cardboard box

Procedure:

Make a layer of marbles in the box so that the marbles are close together. The marbles will represent molecules of a solid substance. Keeping the box flat on a table, move the box back and forth very slowly. Observe the motion of the marbles.

Take some of the marbles out of the box. Move the box back and forth with a little more speed than you did when more marbles were in the box. This demonstrates the movement of molecules in a liquid. Take more marbles out of the box and move the box back and forth with even greater speed. You will find an interesting result if you cut holes in the sides of the box several places and then move the box.

Experiment 6 continued

Questions:

1. The box is moved with less marbles and greater speed. What does this represent?
2. What happens to the marbles, if you cut holes in the sides of the box in several places and then move the box? What does this represent?

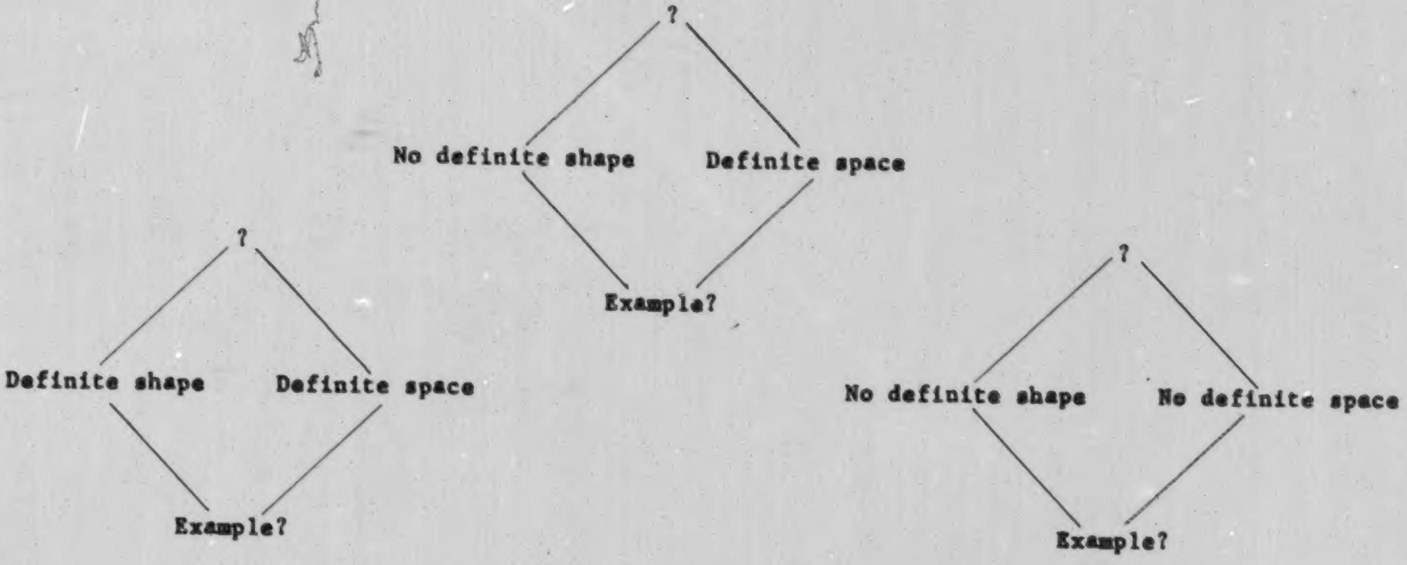
Bibliography

Learning Center 3 and Experiment 1, 2, 3, 4, 5, and 6 are derived from the following source:

Willard J. Jacobson and others, "Probing Into Science," American Book Company, Second Edition, 1968.

STRUCTURED OVERVIEW

The Three States Of Matter


?
No definite shape
Definite space
Example?
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No definite shape
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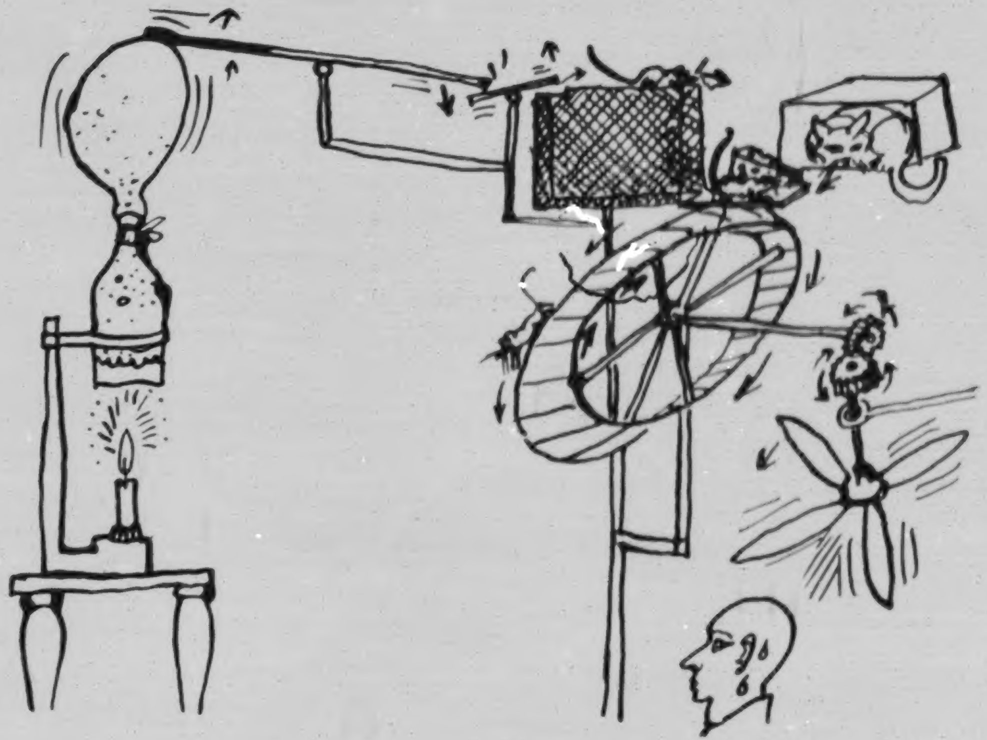
ENERGY TO DO WORK

A Unit of Study for
Physical Science



by

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UNIT OF STUDY

Energy To Do Work

I. Unit Outline

  A. Concepts for emphasis

  B. Activity Key

II. Learning Center Activities

III. Laboratory Experiments

Concepts For Emphasis

The student will:

1. understand that work is done only when something is moved through a distance;
2. understand that the amount of work done depends on how far something is moved and the push or pull needed to move it;
3. recognize that a force is a push- while the force itself is invisible, its results can often be seen and measured;
4. comprehend that energy is the ability to do work;
5. recognize that the energy of moving objects is called kinetic energy and that stored - up is called potential energy.

The books and materials listed on the following pages are keyed to the concepts which will be emphasized in this unit.

MATERIALS LIST

Materials	Concepts				
	1	2	3	4	5
1. Engines, De Camp, L. Spraque (Golden Book Company). Discusses different kinds of engines and how they work.	X				
2. Unseen Forces, Chesters, A. O. (Taplinger Company) Gives on overview of energy and power					X
3. Energy and Power, Irving, Robert (Knoff) Discusses energy and power and how they are used.		X			X
4. What is Energy? Posin, Daniel (Benefic Press) Gives basic information about energy.				X	
5. Push and Pull: The Story of Energy, Blackwood, Paul E. (McGraw Hill Company). A book that discusses the various forms of energy.			X	X	
6. Probing Into Science, Jacobson, Willard J. and others (American Book Company) A basic general science book.	X	X	X	X	X
7. Man and Power, De Camp, L. Spraque (Golden Book Company) Discusses how man uses power and how he harnessed it to do work.		X			X
8. Energy Does Matter, Enmerich, Werner (Walker Company) Gives an overview of energy and how it can be used.			X		X
9. Energy, Wilson, Mitchell and the Editors of Life, (Time Life Incorporated). A book that discusses the different forms of energy.				X	X
10. "Energy from the Sun" Encyclopedia Britannica Film Shows how energy from sunlight is changed and stored.					X
11. "Nature of Energy" Coronet Describes the kinds and forms of energy, including electricity, sound, light, and heat.				X	X
12. "Water Power" Encyclopedia Britannica Film Shows how the potential energy of a waterfall is transformed into kinetic energy.					X
13. "Power" Jim Handy Gives history of power: muscle power, steam, water, electrical, atomic.				X	X
14. "Fuels and Heat" Thorpe Library Filmstrip Explains heat energy and shows steam and gasoline engines				X	X

Students and teacher - directed activities are keyed to the materials and the concepts.

ACTIVITIES

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Activity	Materials	Concepts				
		1	2	3	4	5
1. You will observe the film "Nature of Energy." This activity will introduce you to the unit. There will be a small group discussion on film after you have viewed it. Your teacher will lead the discussion.	11				X	X
2. Rub your hands together vigorously. You have done work since your hands were moving and heat was produced by the work that was performed. Can you think of a way of measuring the amount of heat produced by the rubbing action? Will greater amounts of rubbing produce more heat?	6	X	X		X	
3. Push against the wall in the classroom. Can you move it? Are you tired? Has any work been done? Remember, in science somthing must be moved if work is done.	6	X	X			
4. To illustrate that work is done when something is moved, move objects of various sizes, various distances. Some objects will be provided for you on a table in the classroom.	6,9	X	X			
5. Construct a data sheet on work done in getting to school. The following information should be included: student weight, method of transportation and distance. In collecting your data, be sure to use at least five different students.	4,6	X	X			
6. Find out if you do as much work carrying your empty lunch box from the cafeteria as you do in carrying the full one to the cafeteria.	4,9	X	X		X	
7. Learning Center 1: Measuring force (Note: Learning Center 1 is included in this unit.)	2,5,9,			X		
8. Consider the statement "What goes up, must come down". You will join a discussion group to discuss this statement.	6,9			X		
9. Engage in a tug - of - war. How do you know which side exerts the greatest force? What will happen if both sides exert the same force? Will any work be done if both sides exert the same force? Your teacher will be at the "Tug of War" Station in order to guide this activity.	4,6,9	X		X		
10. Find out what the records are for the greatest weight a man has lifted with his arms or his back. This activity will be done at the library.	4,6		X	X		

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Activity	Materials	Concepts 1	2	3	4	5
11. Learning Center 2: Making a Sensitive Balance (Note: Learning Center 2 is included in this unit.)	4,6		X	X		
12. Visit a jewelry store to see the types of balances used. Report your finding to the class.	6,9			X		
13. Find out why the pivot on the knife - edge of the balance is made of a jewel - like material. Report your findings to the class.	6,9			X		
14. Find out what would happen to the accuracy of a spring scale after a great deal of use or if it is used to weight a very heavy object. Materials will be provided for you to find out this information in the classroom. Discuss your findings with your teacher.	6,9			X		
15. Illustrate kinetic energy by discussing pile drivers, a football being kicked, a bat striking a ball, and cars driven at high speeds and their appearance after collision. What part does speed play in building up kinetic energy? How could this idea be used for safety procedures in driving? What are the dangers of tailgating and excessive speed in cars? You will join a discussion group in order to investigate the answers to these questions.	4,3,9					X
16. Make a list of kinetic energy forms that you have observed.	8,9					X
17. Learning Center 3: Relating the Amount of Kinetic Energy to the Weight of the Moving Material. (Note: Learning Center 3 is included in this unit.)	4,8,9					X
18. Learning Center 4: Potential Energy (Note: Learning Center 4 is included in this unit.)	4,8,9					X
19. Learning Center 5: Potential and kinetic energy. (Note: Learning Center 5 is included in this unit.)	4,8,9					X
20. Make a list of potential energy forms that you have observed.	4,8,9					X

ACTIVITIES

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Activity	Materials	Concepts				
		1	2	3	4	5
21. Try to find as many as you can of the following spring powered divices: Windup toys, model airplanes with propellers driven by twisting rubber bands, sling shots and ancient catapults. Bring your findings to class.	3,4,5,					X
22. Look around the classroom and name as many objects as you can that have potential energy.	4,8,9,					X
23. Discuss the dangers of objects having potential energy in relation to walking on a street which has many tall buildings. How is the danger increased during a wind storm?	4,8,9,					X
24. Experiment 1: How Can the Energy of Falling Water Be Used to Do Work? (Note: Experiment is included in this unit.)	3,8	X				X
25. Answer the questions from the experiment "How Can the Energy of Falling Water Be Used to Do Work."	3,8	X				X
26. Experiment 2: How Can You Make A Simple Balance Scale? (Note: Experiment 2 is included in this unit.)	4,6			X	X	
27. Answer the questions from the experiment "How Can You Make A Simple Balance Scale?"	4,6			X	X	
28. Experiment 3: How Can You Make A Simple Spring Scale? (Note: Experiment 3 is included in this unit.)	4,6			X	X	
29. Answer the questions from the experiment "How Can You Make A Simple Spring Balance?"	4,6			X	X	

Learning Center Activity 1: Measuring Force

Materials Needed:
- spring scale
- string
- block of wood
- pencils
- grease (petroleum jelly)

Procedure:

Attach a spring scale to a block. Pull the block across the table. Record the force necessary to pull the block. Now place two or three pencils under the block. Record the force necessary to pull the block. Is there a difference? Now grease the block and measure the force.

Learning Center Activity 2: Making a Sensitive Balance

Materials Needed:

- pins (straight)
- drinking straws
- rubber bands
- paper clips

Procedure:

Make a very sensitive balance by sticking a pin through the center of a drinking straw. Compare the weights of rubber bands, paper clips, and other materials which can be easily attached the ends of the straw.

Learning Center Activity 3: Relating the Amount of Kinetic Energy to the Weight of the Moving Material.

Materials Needed:
- dish of water
- large pebble
- grain of sand

Procedure:

Relate the amount of kinetic energy to the weight of the moving material. Drop a large pebble and a grain of sand into a dish of water. Which one caused more water to move?

Learning Center Activity 4: Potential Energy

Materials Needed:
- Single facial tissue
- pebble

Procedure:

Two students hold the corners of a single facial tissue. The third student drops a pebble into it from a height of a couple of inches. Then drop the pebble from a height of several feet. What does the pebble do to the tissue? Why? Did you do work? When? Did it take energy?

Learning Center Activity 5: Potential and Kinetic Energy

Materials Needed:

- Paper
- Pencil

Procedure:

Carefully, look around the classroom. Make a list of objects which have potential energy. How could the energy of each object be changed to kinetic? Record your data. Make another list. This time, your list will be made up of objects possessing kinetic energy. How could this energy be changed to potential energy? Be sure to change the energy for each object. Record your data.

Experiment 1: How Can the Energy of Falling Water Be Used to Do Work?

Materials Needed:
- cardboard
- scissors
- toothpick
- thread
- paper clips
- sink

Procedure:

Cut four slits in a circle of cardboard and fold back the edges. Push a toothpick through the center of the circle. Now you have a waterwheel. The toothpick in the shaft. The folded parts are the blades.

Fasten one end of a thread about eight inches long to a chain of three paper clips. Tie the other end of the thread to the shaft of your waterwheel. Be sure it is tied tightly enough to keep from slipping.

Place the edge of the wheel under a stream of water. Hold the ends of the toothpick lightly between your fingers. The water will turn the wheel. The thread will wind up on the shaft and pull the chain of paper clips along with it.

Questions:

1. Did the water do any work?
2. What kind of energy did it use?

Experiment 2: How Can You Make A Simple Balance Scale?

Materials Needed:
- string
- straight stick
- various objects
- hooks
- simple baskets

Procedure:

Put one hook in each end of the stick. Tie one end of the string loosely around the stick near the middle of the stick. Attach the other end of the string to a support. Move the stick until the stick balances evenly.

To use your balances scale, attach objects to the hooks so that you can compare the weights of the objects.

You will find it easier to compare the weights of objects if you make simple baskets to hang from the hooks. The objects to be compared may be placed in the baskets. If you do this, be sure that the stick first balances evenly with the empty baskets before you put objects in the baskets.

The weights of objects can be compared if you notice which end of the stick is pulled down. You can make further comparisons by noticing how far down the end is pulled.

Question:

What force pulls down on the stick?

Experiment 3: How Can You Make A Simple Spring Scale?

Materials Needed:
- rubber band
- paper clips
- small basket
- various objects
- ruler
- paper and pencil

Procedure:

Bend the paper clips into the shape of hooks. Attach one paper clip to a support. Hook the rubber band to this clip.

Slip the other paper clip on the lower part of the rubber band. Hook a small basket to this paper clip.

Try putting small objects into the basket. Does the rubber band stretch? By observing how far the rubber band stretches when different objects are placed in the basket, you can compare the weights of the objects.

If you already know the weights of some objects, you can use this information to compare the weights of other objects. This can be done by using a ruler to measure the length of the stretched rubber band.

You may wish to mark a piece of paper with lines to show the weights of certain numbers of some types of objects. This also can help you to compare weights of objects.

A Nation in Conflict

A Unit of Study for
United States History

by

Solomon M. Wesley
United States History Teacher
Thorpe Junior High School

Concepts for Emphasis

1. The student will understand how the issue of slavery divided the people of the nation in sections.

2. The student will understand that the success of the abolitionist movement was the result of capable leadership.

3. The student will understand the events that led to the Civil War.

4. The student will understand how the Civil War was fought and won.

5. The student will understand the many changes in the South as a result of the Civil War.

6. The student will understand the different ideas for reuniting the nation after the Civil War as proposed by the President and the Congress.

7. The student will understand how the Radical Republican Congress and President Andrew Johnson fought over how Reconstruction should be carried out during the Reconstruction period.

8. The student will understand the national policies carried out during the Reconstruction period.

9. The student will understand how the period of Reconstruction was brought to an end in the South.

10. The student will understand the positive and negative results of Reconstruction and its effect on American life.

The books and materials listed on the following pages are keyed to the concepts and objectives which will be emphasized in this unit.

Materials (Books)	Concepts									
	1	2	3	4	5	6	7	8	9	10
1. Study Lessons in Our Nation's History, Unit V, Abramowitz, Follett Series. (An American History series for basic students made up of eight units.)	X	X	X	X	X	X	X	X	X	X
2. Rise of the American Nation, Lewis Paul Todd and Merle Curti, New York: Harcourt, Brace and World, Inc. 1961, Chapters 18, 19,20. (A history of America)	X	X	X	X	X	X	X	X	X	X
3. Quest for Liberty, June R. Chaplin and others, Sna Francisco: Field Educational Publications, Inc., 1971, Chapters 9-10. (An investigative history of the United States).	X	X	X	X	X	X	X	X	X	X
4. The Golden Book of the Civil War, Charles Flato, New York: Golden Press, 1966. (An in-depth study of the Civil War.)										
5. Old Hate, New Hope, American Adventures Program, Vol. II, F. Louis Friedman and Ira Peck, New York: Scholastic Book Servies, 1970, Chapters 1-14. (A book series on American History)	X	X	X	X	X	X	X	X	X	X
6. American History Skilltext, Harold S. Ritchie and Harold L. Ritchie, Columbus, Charles E. Merrill Books, Inc., 1965. (A comprehensive activity book on American History)	X	X	X	X	X	X	X	X	X	X
7. To Change the World, Milton Meltzer, New York: Scholastic Book Services, 1971. (A picture history of Reconstruction)						X	X	X	X	X
8. The Americans, Staff, Social Studies Curriculum Center, Carnegie-Mellon University, New York: Holt, Rinehart and Winston, Inc., 1970. Chapters 7 and 8. (A history of the United States)	X	X	X	X	X	X	X	X	X	X
9. The Impact of Our Past, Bernard A. Weisberger, New York: American Heritage Publishing Co., Inc., 1972, Chapters 12, 13, 14. (A history of the United States)	X	X	X	X	X	X	X	X	X	X
10. The Free and the Brave, basic edition, Henry F. Graff, Chicago, Rand McNally and Co., 1972, Second Edition, Chapters 19-20. (The story of the American people)	X	X	X	X	X	X	X	X	X	X

Materials (Books)	Concepts 1	2	3	4	5	6	7	8	9	10
11. Songs of the Confederacy, Richard Barksdale Harwell, New York: Broadcast Music, Inc., 1951. (A book of songs sung by the Confederacy)				X						
12. Adventures in American History (Exercise Manual) Naomi Glanzrock, Morristown: Silver Burdett Co., 1967. (An exercise manual in American History)				X						

Materials (Films--Available from ERC)	Concepts 1	2	3	4	5	6	7	8	9	10
13. Civil War: Background Issues, Color, 17 minutes, (1963). Cornet Films. This film analyzes forty years of compromises which bridge the differences between the North and South; these are embodied in the Missouri Compromise, The Wilmot Proviso, The Compromise of 1850, The Kansas Nebraska Act, and the Dred Scott Decision.	X		X							
14. The Civil War 1863-65, 16 minutes, B & W, 1964, Coronet Films. An analyzation of positions of the North and South midway in the war. This film follows the course of the conflict up to the assassination of President Lincoln.				X						
15. Civil War: First Two Years, 16 minutes, Color, 1963, Coronet Films. The film analyzes the relative strengths and weaknesses of both the North and the South, and discusses the political and economic issues of the period.			X	X						
16. Civil War: Postwar Period, 16 minutes, B&W, 1964, Coronet Films. The problems faced by the nation are clarified through a variety of historical materials combined with live action scenes.						X	X	X	X	X
17. The True Story of the Civil War, 33 minutes, B&W, 1956, McGraw-Hill Text Films. This film is an account of the Civil War Years as depicted in Mathew Brady's photographs, newspaper cartoons, and headlines. Leading personalities; Lincoln, Grant, Lee, and Jefferson Davis are described.	X		X	X						
18. Manassas to Appomattox, 35 minutes, Color, 1965, Virginia Department of Education. Documents the story of the Civil War campaign in Virginia from Manassas to Appomattox.				X						

Student and teacher-directed activites are keyed to the materials and the concepts.

Activities	Materials	Concepts 1	2	3	4	5	6	7	8	9	10
1. Draw a map of the United States, showing the Confederate States, the loyal border states and the territories in 1861. An example will be found on p. 327 of Study Lesson In Our Nation's History.	1	X	X		X	X					
2. Read "The Reading Selection", p. 300-301 of your text, Study Lessons in Our Nation's History. Answer study guide questions under "Reading To Find Out," (Why Slavery Caused a Crisis), p. 300. Your teacher will use a DRTA to guide you through the reading selection.	1	X									
3. Read, "The Reading Selection", p. 306-307 of your text, Study Lessons in Our Nation's History. Answer study guide questions under "Reading To Find Out", (The Abolitionist Movement), p. 321. Your teacher will use a DRTA to guide you through the reading selection	1		X								
4. Read, "The Reading Selection', p. 321-322 of your text, Study Lessons in Our Nation's History. Answer study guide questions under "Reading To Find Out," (Events Leading To the Civil War), p. 321. Your teacher will use a DRTA to guide you through the reading selection.	1			X							
5. Read "The Reading Selection". p. 326-327 of your test, Study Lessons in Our Nation's History. Answer study guide questions under "Reading to Find Out," (The Civil War), p. 325. Your teacher will use a DRTA to guide you through the reading selection.	1				X						
6. Read "The Reading Selection", p. 335 of your text, Study Lessons in Our Nation's History.	1					X					
Answer study guide questions under "Reading to Find Out," (Results of the Civil War), (Continued)											

Activities	Materials	Concepts									
		1	2	3	4	5	6	7	8	9	10
(Activity 6 continued) p. 335. Your teacher will use a DRTA to guide you through the reading selection.	1					X					
7. Read "The Reading Selection," p. 338 of your text, Study Lessons in Our Nation's History. Answer study guide questions under "Reading to Find Out," (Plans for reuniting the Nation), p. 338. Your teacher will use a DRTA to guide you through the reading selection.	1						X				
8. Read "The Reading Selection," p. 341 of your text, Study Lessons in Our Nation's History. Answer study guide questions under "Read to Find Out," (Congress Versus the President) p. 341. Your teacher will use a DRTA to guide you through the reading selection.	1							X			
9. Read "The Reading Selection", p. 343-344 of your text, Study Lessons in Our Nation's History. Answer study guide questions under "Reading to Find Out," Reconstruction of the South, p. 343. Your teacher will use a DRTA to guide you through the reading selection.	1								X		
10. Read "The Reading Selection", p. 346 of your text, Study Lessons in Our Nation's History. Answer study guide questions under "Reading to Find Out", (The End of Reconstruction), p. 345. Your teacher will use a DRTA to guide you through the reading selection.	1									X	
11. Read "The Reading Selection", p. 348-349 of your text, Study Lessons in Our Nation's History. Answer study guide questions under "Reading to Find Out," (Results (Continued)	1										X

Activities	Materials	Concepts									
		1	2	3	4	5	6	7	8	9	10
of Reconstruction) p. 348. Your teacher will use a DRTA to guide you through the reading selection.											
12. Define the vocabulary words using the glossary of terms provide in this unit.		X	X	X	X	X	X	X	X	X	X
13. Test your knowledge of new vocabulary using the cross-word puzzle activity provided in this unit.	12					X					
14. Test your knowledge of new vocabulary using the matching activity provided in this unit.		X	X	X	X	X	X	X	X	X	X
15. Perform "Exercises to Help You Understand," p. 301 of your text, Study Lessons in Our Nation's History. (Why Slavery Caused a Crisis)	1	X									
16. Perform "Exercises to Help You Understand," p. 307 of your text, Study Lessons in Our Nation's History. (The Abolitionist Movement)	1	X									
17. Perform "Exercises to Help You Understand," p. 322 of your text, Study Lessons in Our Nation's History. (Events Leading to the Civil War).	1			X							
18. Perform "Exercises to Help You Understand," p. 328-239 of your text, Study Lessons in Our Nation's History. (The Civil War)	1				X						
19. Perform "Exercises to Help You Understand," p. 336 of your text, Study Lessons in Our Nation's History. (Results of the Civil War)	1					X					
20. Perform "Exercises to Help You Understand," p. 339 of your text, Study Lessons in Our Nation's History. (Plans for Reuniting the Nation)	1						X				

Activities	Materials	Concepts									
		1	2	3	4	5	6	7	8	9	10
21. Perform "Exercises to Help You Understand," p. 342 of your text, Study Lessons in Our Nation's History. (Congress Versus the President)	1							X			
22. Perform "Exercises to Help You Understand," p. 344-345 of your text, Study Lessons in Our Nation's History. (Reconstruction of the South)	1								X		
23. Perform "Exercises to Help You Understand," p. 347 of your text, Study Lessons in Our Nation's History. (The End of Reconstruction)	1									X	
24. Perform "Exercises to Help You Understand," p. 340-350 of your text, Study Lessons in Our Nation's History. (Results of Reconstruction)	1										X
25. Today, we will take a field trip to the Peninsula War Memorial Museum in Newport News to see examples of uniforms, equipment, and guns used in the Civil War.					X						
26. Today, we will take a field trip to the site of the Battle of Big Bethel located on Bethel Road in Hampton to see the monument, cemetery, graveyard, and lay of the land to understand the role the battle played in the Civil War fighting on the Peninsula.					X						
27. Today, we will take a field trip to Mariner's Museum to see the re-enactment of the battle between the Moniter and the Merrimac that took place in Hampton Roads to undertand the changes in naval warfare.					X						
28. Write a report about the different attitudes Americans had about slavery. Include the views of John Brown, Harriet Beecher Stowe, Abraham Lincoln, (Continued)	1	X	X								

Activities	Materials	Concepts									
		1	2	3	4	5	6	7	8	9	10
Stephen A. Douglas, Harriet Tubman, and Roger B. Taney. Much of the information can be found in your text and in the school library.											
29. Make a book using the words of songs sund during the Civil War, and try to determine how the words show that both sides believed their cause was right and the suffering that a civil war causes.	11				X						
30. Develop a play about some of the following: 1) Lee's refusal to take command of the Union Army. 2) Lincoln's meeting with McClellan after the Battle of Antietam or with Meade after the Battle of Gettysburg, 3) a Confederate cabinet meeting after the capture of Atlanta, 4) Lee's surrender at Appomattox. Your teacher will provide assistance and schedule the day of presentation.					X	X					
31. Write a report on the Balck Congressmen during the Reconstruction period showing their background and what motivated them to enter politics.	7					X	X	X	X	X	X
32. Prepare a bulletin display with your teacher's guidance that shows the growth of the "new South" since the Civil War. You may use reference books, magazine articles, and other materials to show how new jobs and business opportunities for minorities are increasing in the South.											X
33. Prepare a panel discussion on the life and philosophy of Booker T. Washington stating his advice for Blacks and show how and why his views were challenged by some Black leaders. Your teacher will assist you and will schedule your presentation.									X	X	X

Activities	Materials	Concepts									
		1	2	3	4	5	6	7	8	9	10
34. Prepare a series of "Hall of Fame" booklets containing information, pictures, cartoons and other pertinent data on the following people: Frederick Douglas, Dred Scott, Henry Clay, Jefferson Davis, Stonewall Jackson, George McClellan, Ulysses S. Grant, William Lloyd Garrison, John C. Calhoun, Robert E. Lee, William T. Sherman and Clara Barton. Your teacher will assist you.											
35. Write a composition entitled, "If Booth Had Missed" showing how Reconstruction may have been different in result and how Black freedom may not have been lost to segregation had President Lincoln lived.											
36. Pretend you are an "on the spot" radio commentator, describing 1) Lincoln's inauguration, 2) the surrender of the South at Appomattox 3) Jefferson Davis' inauguration. Your teacher will direct you in this activity.											
37. Prepare a report on the participation of your city and state in the Civil War. Include the participation of any of your ancestors.											
38. Draw two cartoons showing your interpretation of how the North and the South reacted to the Dred Scott Decision.											
39. Present a play, pretending to be slaves, demonstrating how the Underground Railroad operated. Your teacher will schedule your presentation.											
40. Write a report on the role of the Negro in the Civil War in both the North and the South.											

Activities	Materials	Concepts									
		1	2	3	4	5	6	7	8	9	10
41. Write a report on the Black's Codes and show how they were designed to control the activities of Blacks.											
42. Write a detailed report comparing the issues and the procedure involved in the impeachment of President Andrew Johnson and the possible impeachment of President Richard M. Nixon.											
43. Today you will view the film: "Civil War: Background Issues."											
44. Today you will view the film: "The Civil War: 1863-1865."											
45. Today you will view the film: "Civil War: First Two Years."											
46. Today you will view the film: "Civil War: Post War Period."											
47. Today you will view the film: "The True Story of the Civil War."											
48. Today you will view the film: "Manassas to Appomattox."											
49. Test your knowledge of new vocabulary using the Word Puzzle activity provided in this unit.											

ACTIVITY 12

Vocabulary Study Guide

1. crisis - critical moment
2. compromise - settlement by agreement between opposing side
3. retain - to keep
4. transport - to move or carry to another place
5. abolish - to do away with something
6. voluntary - unasked; freely done
7. suspicion - uneasy feeling about someone or something
8. arsenal - place where weapons are made and stored
9. secede - to withdraw from a group or nation
10. enmity - anger or hatred
11. wealth - riches
12. recruit - one who joins the army; new member of an organization
13. emancipate - to set free
14. authority - power or right to do something
15. oath - pledge or promise
16. allegiance - loyalty
17. assassinate - to murder by surprise or secret attack
18. reconstruct - to rebuild
19. denounce - to accuse of wrong doing
20. impeach - to bring to trial on a charg of wrongdoing in office
21. corrupt - dishonest
22. allies - people or groups joined together to help each other
23. legal - lawful
24. segregation - separation of people into racial groups

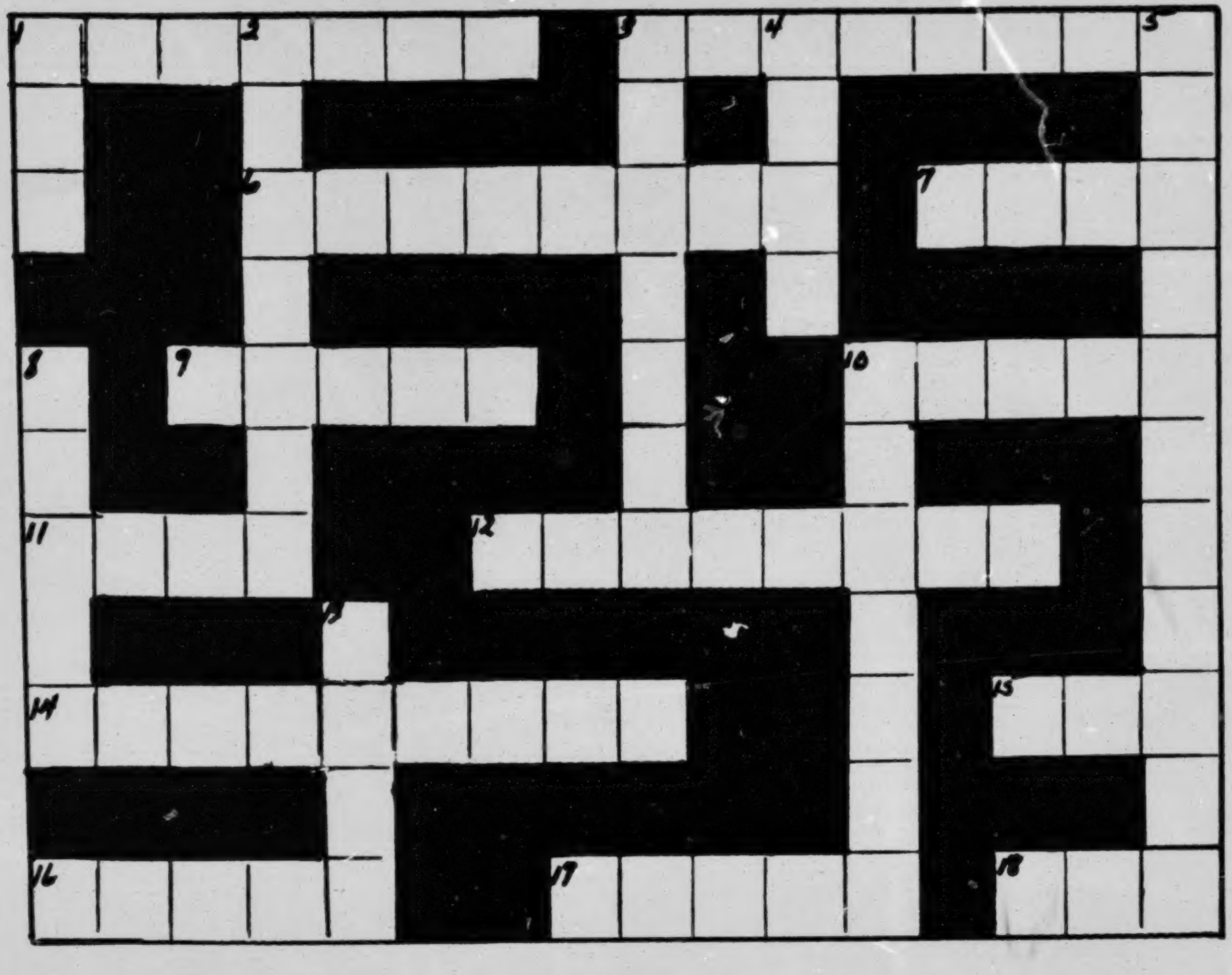
ACTIVITY 13A

Vocabulary Study Guide for Crossword Puzzle

1. Abraham Lincoln - President of United States during the Civil War
2. Robert E. Lee - surrendered at Appomattox Court House
3. Merrimac - the Confederate ironclad ship
4. road - a strip of land with a hard surface to walk or drive on
5. confederate - the states that seceded so-called
6. Virginia - the capital of the Confederacy
7. iron - metal that covered the Merrimac and Monitor
8. slave - a person who is owned like property
9. siege - an army surrounding a place until it surrenders
10. army - a large body of military personnel
11. strategy - a war plan
12. territory - land
13. United States of America - the Union
14. draft - a law that puts men into service
15. Union - the body the Confederate states seceded from
16. Ulysses S. Grant - general who forced the surrender of Vicksburg
17. riot - fighting and violence in the streets
18. Monitor - the Union ironclad ship
19. William T. Sherman - general who march across Georgia

ACTIVITY 13B

Crossword Puzzle



Across

1. President of U.S. during Civil War
3. Confederate iron clad ship
6. The capital of the Confederacy was in this state
7. The Monitor and the Merrimac were covered with this metal
9. A person who is owned like property
10. An army surrounding a place until it surrenders
11. Most soldiers are part of an __________.
12. A war plan.
14. Land
15. The initials of the United States of America
16. A law that puts men into the army
17. The Confederate states seceded from the _____.
18. The general who surrendered at Appomattox

Down

1. Same as number 18 across
2. Soldiers on horseback
3. The Union ironclad ship
4. A strip of land with a hard surface to walk or drive on
5. The states that seceded called themselves the ____ States of America.
8. The general who forced Vicksburg to surrender.
10. The general who marched across Georgia
13. Fighting and violence in the streets

ACTIVITY 14

Glossary - Matching

Directions: In Column B there are definitions for the words listed in Column A. Match each word and its definition. Place the letter of the definition on the line in front of the word it defines.

Column A

___1. compromise

___2. transport

___3. secede

___4. enmity

___5. wealth

___6. recruit

___7. authority

___8. oath

___9. reconstruct

___10. impeach

___11. corrupt

___12. allies

___13. legal

Column B

a. unlawful

b. power or right to do something

c. to rebuild

d. to bring to trial on a charge of wrongdoing in office

e. dishonest

f. lawful

g. to move or carry to another place

h. people or groups joined together to help each other

i. to withdraw from a group or nation

j. pledge or promise

k. settlement by agreement between opposing side

l. anger or hatred

m. one who joins the army; a new member of an organization

n. riches

ACTIVITY 49

Glossary - Word Puzzle

Directions: To solve the following puzzle, look at the definitions below. Think of a word which fits a definition and has the same number of letters as the number of spaces provided in the corresponding line and has the given letter in the same position as indicated. Write the word on the line. The first one is done for you.

1. A L L E G I A N C E
2. _ _ _ S _ _
3. _ _ S _ _ _ _
4. _ _ _ A _ _
5. _ _ _ _ _ S _ _ _ _ _
6. _ _ _ _ _ S _
7. _ _ _ _ I _ _ _ _
8. _ _ _ _ _ N _ _
9. _ _ _ _ _ _ A _ _ _ _
10. _ _ _ _ _ T _ _ _
11. _ _ _ _ _ _ _ _ _ E

1. loyalty
2. critical moment
3. place where weapons are made and stored
4. to keep
5. to murder by surprise or secret attack
6. to do away with something
7. uneasy feeling about someone or something
8. to accuse of wrong doing
9. separation of people into racial groups
10. unasked; freely done
11. to set free

A NEW NATION IS LAUNCHED

A Unit of Study for
United States History

We the People

by

Solomon M. Wesley
United States History Teacher
Thorpe Junior High School

Concepts For Emphasis

1. The student will understand the many difficult problems faced by the new United States.
2. The student will understand how the success of the Constitutional Convention was the result of capable leadership.
3. The student will understand that agreement was reached in Philadelphia as a result of compromise.
4. The student will understand that the Constitution was ratified in 1788.
5. The student will understand that Congress receives its authority from the Constitution.
6. The student will understand how the Constitution limits the authority of the President.
7. The student will understand that the federal system of courts were set up in the Constitution.
8. The student will understand how the federal system is based upon elected representatives, division of powers, checks and balances and personal liberties.
9. The student will understand how the Bill of Rights guarantees the personal liberties of all Americans.

The books and materials listed on the following pages are keyed to the concepts and objectives which will be emphasized in this unit.

Materials List

Materials (Books & Film Strips)	Concepts 1	2	3	4	5	6	7	8	9
1. Study Lessons In Our Nation's History, Unit II, Abramowitz (Follett) (An American History series of eight units)	X	X	X	X	X	X	X	X	X
2. The Making of A Nation, Vol. II, Morris (Time Incorporated) (A History of America)	X	X	X	X	X	X	X	X	X
3. A Nation Conceived And Dedicated, Vol. I, Hoexter and Peek, (Scholastic Book Services) (A History of America)	X	X	X	X				X	X
4. Lamps To Light The Way--Our Presidents, Barclay, (Bowmar) (A book on American Presidents)		X				X			
5. This Is America's Story, Anderson (Houghton Mifflin Company) (A History of America)	X	X	X	X	X	X	X	X	X
6. American History Skilltext, Ritchie and Ritchie (Merrill Books, Inc.) (A comprehensive activity book of American History)	X	X	X	X	X	X	X	X	X
7. Sweet Land of Liberty, Bacon (Denoyer-Geppert Company) (A History of America)	X	X	X	X	X	X	X	X	X
8. Building The American Nation, Reich/Biller (H. B. Jovanovich, Inc.) (A History of America)	X	X	X	X	X	X	X	X	X
9. The Free and the Brave, Basic Edition, Graff (Rand McNally & Company) (A story of the American people)	X	X	X	X	X	X	X	X	X
10. A New Nation Is Born, (Thorpe's Library) FS 300		X	X	X	X	X	X	X	
11. A New Experiment and A New Nation, (Thorpe's Library) FS 82		X	X	X	X	X	X	X	X
12. Writing The Constitution, (Thorpe's Library) FS 634	X	X	X	X	X	X	X	X	X
13. The Bill of Rights and other Amendments, (Thorpe's Library) FS 913								X	X
14. Our Constitution, (Thorpe's Library) FS 865			X		X	X	X	X	
15. Ben Franklin of Old Philadelphia, (Thorpe's Library) FS 97		X		X					
16. A New Plan of Government, (Thorpe's Library) FS 302			X		X	X	X	X	X
17. Problems of The New Nation, (Thorpe's Library) FS 303	X			X					

Student and teacher-directed activities are keyed to the materials and the concepts.

Activities	Materials	Concepts 1	2	3	4	5	6	7	8	9
1. Draw a picture showing the serious attitude of the delegates at the Constitutional Convention. An example will be found on p. 86 of Study Lessons In Our Nation's History.	1	X	X	X						
2. Draw a map of the United States, showing its physical growth and boundaries in 1789. An example will be found on p. 123 of Study Lessons In Our Nation's History.	1	X	X	X		X				
3. Write a report on the life of George Washington showing how his life justified the statement of one of the Lees: "First in war, first in peace, first in the hearts of his countrymen."			X	X						
4. Read "Reading Selections", p. 85-86 of your text, Study Lessons In Our Nation's History. Answer study guide questions under "Reading To Find Out". (Problems of The Convention) Use Three Level Study Guide found in this unit in "Constitutional Convention". Your teacher will use a DRTA to introduce you to the lesson. Before reading this selection your teacher will introduce you to the reading using a structured overview. (Teacher: This structured overview is provided within this unit.)	1	X								
5. Read "Reading Selection", p. 92-95 of your text, Study Lessons In Our Nation's History. Answer study guide questions under "Reading To Find Out", (Leaders of The Convention). Your teacher will use a DRTA to introduce you to the lesson.	1		X	X						
6. Read "Reading Selection", p. 97-98 of your text, Study Lessons In Our Nation's History. Answer study guide questions under "Reading To Find Out", (Compromises of The Convention). Use the Three Level Study Guide on "The Expanding Constitution", found in this unit.	1			X	X					
7. Read "Reading Selection", p. 100-101 of your text, Study Lessons In Our Nation's History. Answer study guide questions under "Reading To Find Out", p. 100 (Ratifying the Constitution) Your teacher will use a DRTA to guide you through the reading selection.	1					X				

Activities	Materials	Concepts								
		1	2	3	4	5	6	7	8	9
8. Read "Reading Selection", p. 104 of your text, Study Lessons In Our Nation's History. Answer study questions under "Reading To Find Out", p. 103. (The Legislative Branch: Congress) Your teacher will use a DRTA to guide you through the reading selection.	1					X				
9. Read "Reading Selection", p. 107-108 of your text, Study Lessons In Our Nation's History. Answer questions under "Reading To Find Out", p. 107. (The Executive Branch: The President) Your teacher will use a DRTA to guide you through the reading selection.	1						X			
10. Read "Reading Selection", p. 111 of your text, Study Lessons In Our Nation's History. Answer study questions under "Reading To Find Out", p. 111 (The Judicial Branch: the Federal Courts)	1							X		
11. Read "Reading Selection", p. 113-114 of your text, Study Lessons In Our Nation's History. Answer study questions under "Reading To Find Out", p. 113. (The American System of Government) A DRTA will be used and a Three Level Study Guide on "The Federal System".	1								X	
12. Read "Reading Selection", p. 117 of your text, Study Lessons In Our Nation's History. Answer questions under "Reading To Find Out", p. 116. (The Bill of Rights)	1									X
13. Define the vocabulary words using glossary of terms provided in this unit.	1	X	X	X	X	X	X	X	X	X
14. Test your knowledge of new vocabulary using matching activity provided in this unit.	1	X	X	X	X	X	X	X	X	X
15. Test your knowledge of new vocabulary using the Word Puzzle activity provided in this unit.	1	X	X	X	X	X	X	X	X	X
16. Perform "Exercises to Help You Understand", p. 86-87, of your text, Study Lessons In Our Nation's History. (Problems of the Constitutional Convention)	1	X								

Activities	Materials	Concepts								
		1	2	3	4	5	6	7	8	9
17. Perform "Exercises to Help You Understand", p. 93-94, in your text, Study Lessons In Our Nation's History (Leaders of the Convention)	1		X							
18. Perform "Exercises to Help You Understand", p. 98-99, in your text, Study Lessons In Our Nation's History (Compromises of the Convention)	1			X						
19. Perform "Exercises to Help You Understand", p. 101, in your text, Study Lessons In Our Nation's History (Ratifying the Constitution)	1				X					
20. Perform "Exercises to Help You Understand", p. 104-105, in your text, Study Lessons In Our Nation's History (The Legislative Branch: Congress)	1					X				
21. Perform "Exercises to Help You Understand", p. 108-109, in your text, Study Lessons In Our Nation's History (The Executive Branch: The President)	1						X			
22. Perform "Exercises to Help You Understand", p. 112, in your text, Study Lessons In Our Nation's History (The Judicial Branch: the Federal Courts)	1							X		
23. Perform "Exercises to Help You Understand", p. 114-115, in your text, Study Lessons In Our Nation's History (The American System of Government)	1								X	
24. Perform "Exercises to Help You Understand", p. 117-118, in your text, Study Lessons In Our Nation's History (The Bill of Rights)	1									X
25. Write a report on any one of the original thirteen states showing the difficulty of the state in ratifying the Constitution.	1	X	X	X	X	X	X	X	X	X
26. Write a report on your favorite President and justify your selection.			X			X				
27. Write a report on The Supreme Court showing its functions and responsibilities.								X	X	

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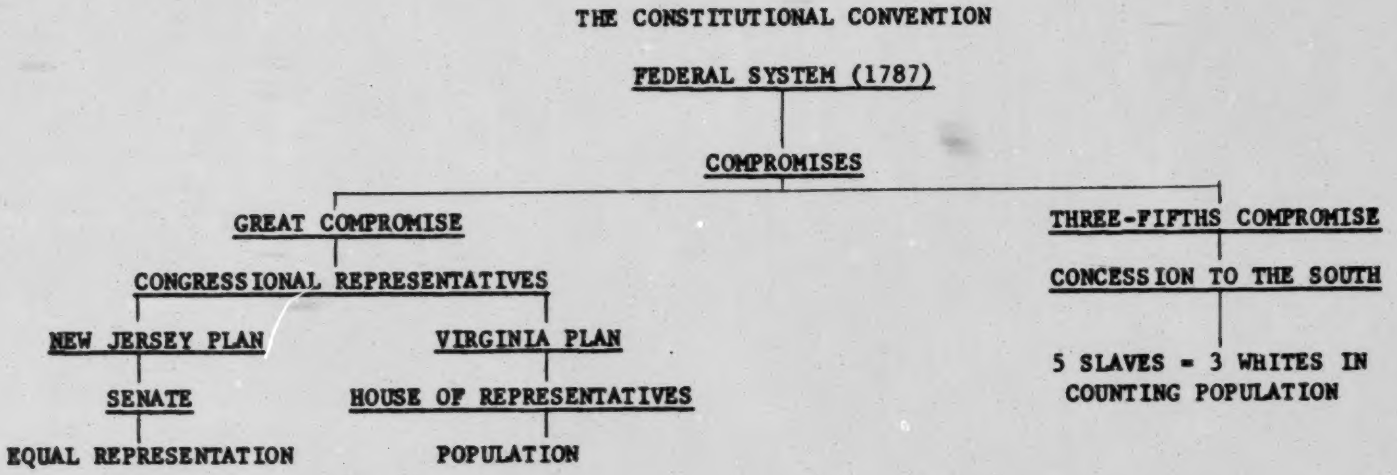
Activities	Materials	Concepts								
		1	2	3	4	5	6	7	8	9
28. Today we will take a field trip to the Yorktown battle field in order to see the lay out of the land, redoubts, and the fortifications which demonstrate Washington's victory over the British.		X								
29; Write a detailed report on any one of the signers of the Constitution.		X	X	X	X	X				
30. Today you will view a film on the federal system, entitled "A New Plan of Government".	16			X		X	X	X	X	X
31. Make a chart showing the System of Checks and Balances. You can find some information necessary in making this chart on p. 115 of your text, Study Lessons In Our Nation's History.	1				X	X	X	X		
32. Today you will view a film on the Constitutional Convention, entitled "A New Nation is Born".	10		X	X	X	X	X	X	X	
33. Today you will view the film, "A New Experiment and A New Nation".	11		X	X	X	X	X	X	X	X
34. Today you will view the film, "Writing the Constitution"	12	X	X	X	X	X	X	X	X	X
35. Today you will view the film, "The Bill of Rights and other Amendments".	13								X	X
36. Today you will view the film, "Our Constitution".	14			X		X	X	X	X	
37. Today you will view the film, "Ben Franklin of Old Philadelphia".	15		X		X					
38. Today you will view the film, "Problems of The New Nation".	17	X			X					
39. Make a chart showing how a bill becomes a law, p. 106 of your text, Study Lessons In Our Nation's History (Purpose: to show the difficulty in getting a bill through Congress)	1					X				
40. Research and write a detailed report showing the differences between the New Jersey, Virginia and Connecticut Plans for our federal government.		X	X	X		X	X	X		

		Concepts								
Activities	Materials	1	2	3	4	5	6	7	8	9
41. Design a newspaper article defending the ratification of the Constitution to those states that opposed ratification. Ideas for your article can be found on p. 102 of your text, Study Lessons In Our Nation's History (The Federalist Papers). Perhaps your article will be published in our school newspaper!	1				X					
42. Prepare to give a speech opposing the Bill of Rights as a member of Congress. Discuss with your teacher a date for presentation.				X						X
43. Prepare to present a debate: Be it resolved: Should the Supreme Court have the power of judicial review? (The Constitution does not grant the court this power.) p. 139 of your text, Study Lessons In Our Nation's History. When your debate is ready your teacher will schedule you for presentation.	1							X	X	

ACTIVITY 4

STRUCTURED OVERVIEW


THE CONSTITUTIONAL CONVENTION
FEDERAL SYSTEM (1787)
COMPROMISES
GREAT COMPROMISE
CONGRESSIONAL REPRESENTATIVES
NEW JERSEY PLAN
SENATE
EQUAL REPRESENTATION
VIRGINIA PLAN
HOUSE OF REPRESENTATIVES
POPULATION
THREE-FIFTHS COMPROMISE
CONCESSION TO THE SOUTH
5 SLAVES = 3 WHITES IN COUNTING POPULATION

Activity 4

Three Level Study Guide
The Constitutional Convention (1787)

Level I (Factual)

Directions: Check the paragraph which best tells what happened in the reading selection.

_____ 1. The Articles of Confederation had many weaknesses.

_____ 2. The thirteen states worked closely together.

_____ 3. Many businessmen and merchants wanted a strong national government.

_____ 4. America had no system of national courts.

_____ 5. Under the Articles of Confederation, America did not have much power in the national government.

_____ 6. The Constitutional Convention was held in New York.

_____ 7. George Washington wanted the states to work together.

_____ 8. The leaders of the Convention were George Washington, Benjamin Franklin, James Madison and Alexander Hamilton.

_____ 9. The Constitutional Convention was called to make changes in the Articles of Confederation.

_____10. The direct result of the Convention was the writing of the Constitution.

_____11. The nation has been governed by the Constitution since 1789.

Level II (Interpretive)

Directions: Check those items which are correct interpretations of the reading selection. Be prepared to identify each interpretation you select with the part of the reading selection it interprets.

_____ 1. George Washington was a man of peace.

_____ 2. Equal power was shared by the national government and the states.

_____ 3. Secret meetings were held because no one could be trusted.

_____ 4. Few delegates attended the Constitutional Convention.

_____ 5. Without money governments fail.

_____ 6. Power is always necessary to properly do a job.

_____ 7. Several meetings were necessary because of division in the states.

_____ 8. The states were fearful of the national government.

_____ 9. Washington was fearful that disagreement was dangerous for the states.

_____10. The Annapolis meeting was an attempt at unity.

_____11. Other ____

Level III (Applied)

Directions: Which of the following statements best express the meaning of the reading selection.

_____ 1. A chain is only as strong as its weakest link.

_____ 2. Two heads are better than one.

_____ 3. Destroy the head and the body must die.

_____ 4. Haste makes waste.

_____ 5. In unity, there is strength.

_____ 6. United we stand, divided we fall.

_____ 7. Why bother, they are going to have their way.

_____ 8. The strong survive, the weak die.

_____ 9. Other ____

Activity 6

Three Level Study Guide
"The Expanding Constitution"

Level I

Directions: Check the paragraph which best tells what happened in the reading selection.

_____ 1. Americans control their government because they elect the people who best represent their interests.

_____ 2. There are three branches of government.

_____ 3. The federal government has powers not held by the states.

_____ 4. The founding fathers feared that any government might become too powerful.

_____ 5. The states have the power to tax and borrow money.

_____ 6. The federal government controls marriage.

_____ 7. No single branch of government can gain all of the powers.

_____ 8. The Bill of Rights are useless.

_____ 9. The federal government has the power to tax and borrow money.

Level II

Directions: Check those items which are "correct" interpretations of parts of the reading selection. Be prepared to identify each interpretation you select with the part of the reading selection it interprets.

_____ 1. Some American governmental officials are elected directly.

_____ 2. Some American governmental officials are elected indirectly.

_____ 3. America represents fifty separate states held together by a federal union.

_____ 4. The author feels that a separation of powers is necessary in a democracy.

_____ 5. No human is able to handle too much power.

_____ 6. Some powers are held by both the federal and state government.

_____ 7. Each branch of government keeps an eye on all other branches.

_____ 8. All powers held by the federal government are also held by the states.

_____ 9. The Bill of Rights protects personal liberties.

_____10. Other ____

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Level III

Directions: Which of the following statements best express the meaning of the reading selection.

_____ 1. Dictators rule when people fail to rule.

_____ 2. Our federal union should be like a happy marriage.

_____ 3. There is no need for concern because our rights will always be there.

_____ 4. My vote does not count, so why bother.

_____ 5. Other ____

Activity 13

Vocabulary Study Guide

1. founding - beginning; establishing
2. several - more than one
3. record - account of what takes place
4. revise - to change
5. retirement - giving up active work
6. compromise - agreement, or meeting ground, between different views
7. population - number of people in a certain area
8. approve - to consent to; vote for
9. equal - the same
10. ratify - to accept by vote
11. defense - argument for something
12. majority - more than half
13. supreme - highest
14. regulate - to control
15. enforce - to carry out laws or decision
16. misconduct - bad conduct
17. ambassador - representative of a country in another country
18. interpret - to decide or tell the meaning of
19. judicial - of judges, having to do with courts of law
20. treaty - agreement between two nations
21. disapproval - feeling or opinion against something
22. veto - to refuse to approve
23. mint - to make coins, money
24. petition - to request or ask
25. warrant - a legal court order
26. testify - to make a statement, usually in a court
27. constitution - laws or principles governing a nation

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Activity 14

Glossary - Matbhing

Directions: In Column B there are definitions for the words listed in Column A. Match each word and its definition. Place the letter of the definition on the line in front of the word it defines.

COLUMN A

___ 1. several
___ 2. record
___ 3. revise
___ 4. approve
___ 5. ratify
___ 6. defense
___ 7. supreme
___ 8. regulate
___ 9. ambassador
___10. treaty
___11. disapproval
___12. veto
___13. mint
___14. warrant
___15. testify

COLUMN B

a. to consent to
b. highest
c. representative of a country in another country
d. feeling or strong opinion against something
e. to make coins, money
f. to refuse to approve
g. to change
h. agreement between two nations
i. to accept by vote
j. a legal court order
k. beginning; establishing
l. more than one
m. to make a statement, usually in court
n. to control
o. argument for something
p. account of what takes place

Glossary - Word Puzzle

Directions: To solve the following puzzle, look at the definitions below. Think of a word which fits a definition and has the same number of letters as the number of spaces provided in the corresponding line, and has the given letter in the same position as indicated. Write the word on the line. The first one is done for you.

1. C O M P R O M I S E
2. _ O _ _ _ _ _ _
3. _ N _ _ _ _ _
4. _ _ _ S _ _ _ _ _ _ _ _
5. _ _ T _ _ _ _ _ _
6. _ _ _ I _ _ _ _
7. _ _ T _ _ _ _ _ _ _
8. _ _ U _ _
9. _ _ _ _ _ _ T _ _ _
10. _ _ _ _ _ I _ _
11. _ _ _ O _ _ _ _
12. _ _ _ _ _ N _ _ _ _

1. agreement, or meeting ground, between different views
2. beginning; establishing
3. to carry out laws or decisions
4. laws or principles governing a nation
5. to decide or tell the meaning of something
6. of judges; having to do with courts
7. giving up active work
8. the same
9. number of people in a certain area
10. to request or ask
11. more than half
12. bad conduct

Activity 15 Key

1. COMPROMISE
2. FOUNDING
3. ENFORCE
4. CONSTITUTION
5. INTERPRET
6. JUDICIAL
7. RETIREMENT
8. EQUAL
9. POPULATION
10. PETITION
11. MAJORITY
12. MISCONDUCT

PROBLEM: If you are not able to measure any given distance to the nearest inch, half-inch, quarter-inch or eighth-inch, take this inch pill.

DOSAGE: Use whenever needed.

by

Barbara H. Cutchins
IMS Mathematics Teacher
Thorpe Junior High School

The inch pill has been developed to supplement the levels III, IV, and V Measurement Skill Folders in the IMS Program. This unit is designed to give detailed instruction in using the inch, half-inch, quarter-inch, and eighth-inch when measuring to the nearest specified unit. When the student has mastered this assignment, it is hoped, he will be able to move through the measurement folders with greater understanding and increased accuracy.

CONCEPTS FOR EMPHASIS

When you have taken a complete Inch Pill with success, you will know the following facts.

Behavioral Objectives

1. The inch is the basic unit of linear measurement in the English System.

2. A measurement has two parts:
   a. a measure which is named by a symbol
   b. a unit of measure which is named by a word or an abbreviation for that word.

3. All measurements are of different precisions; therefore, one measurement may be more precise than another measurement.

4. The smaller the unit of measure used, the more precise the measurement.

5. No matter how precise a measurement might be, the measurement is still an approximation.

You will also become skilled in the following areas.

6. Using a ruler with one-inch divisions you will be able to measure objects or pictures to the nearest inch.

7. Given a measurement in inches you will be able to use an inch ruler to measure a line segment having that length.

8. Using a ruler with half-inch divisions you will be able to measure objects or pictures to the nearest half-inch.

9. Given a measurement in half-inch units you will be able to use a ruler with half-inch divisions to measure a line segment having that length.

10. Using a ruler with quarter-inch division you will be able to measure objects or pictures to the nearest quarter-inch.

11. Given a measurement in quarter-inch units you will be able to use a ruler with quarter-inch divisions to measure a line segment having that length.

12. Given any specific measurement you will be able to draw that line segment.

13. Given any object or set of objects you will be able to measure them to the nearest unit indicated.

The books and materials listed on the following pages are keyed to the concepts and objectives which will be emphasized in this unit.

	Learning Objectives												
Materials Used	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Ruler with one-inch divisions	X	X	X	X	X	X	X						
2. Inch Pill Pack #1 (Included in this unit)	X	X	X	X	X	X	X						
3. Filmstrip: History of Measurement (SVE)	X	X	X	X	X	X	X						
4. Filmstrip Previewer	X	X	X	X	X	X	X					X	X
5. Cuisenaire Rods (1 Box)	X	X	X	X	X	X	X					X	X
6. Fabric Scraps	X	X	X	X	X	X	X						
7. Fabric Box	X	X	X	X	X	X	X						
8. Needle	X	X	X	X	X	X	X						
9. Thread	X	X	X	X	X	X	X						
10. Scissors	X	X	X	X	X	X	X						
11. Ruler with one-half inch divisions								X	X				
12. Inch Pill Pack #2 (Included in this unit)	X	X	X	X	X	X	X						
13. Inch Pill Pack #3 (Included in this unit)								X	X	X	X		
14. Teacher-made Tape Subject: Side 1. Improving Measurement Skills Side 2. Checking Your New Skills (Tape description is included in this unit)										X	X		
15. Filmstrip: Precision Measurement												X	X
16. Ruler with quarter-inch divisions										X	X		
17. 12" ruler (regular classroom type)												X	X

Technical Vocabulary Study

Word Study

inch

half-inch

quarter-inch

measure

measurement

symbol

linear measurement

abbreviation

unit

precise

precision

WORD FUN

Unscramble this word scramble.

1. tuin ____________________________
2. chin ____________________________
3. mbysol ____________________________
4. chin lafh ____________________________
5. ustemmearne ____________________________
6. chin ruaqret ____________________________
7. creipes ____________________________
8. bebavaritno ____________________________

Student and teacher-directed activities are keyed to the materials and the concepts.

Activities	Materials	Concepts For Emphasis 1	2	3	4	5	6	7	8	9	10	11	12	13
Section I: The Inch	1,2,3,4, 5,6,7,8, 9,10,12	X	X	X	X	X	X	X						
a. Lesson 1: Measuring With The Inch	(See above listing)	X	X	X	X	X	X	X						
b. Lesson 2: Filmstrip-History of Measurement	(See above listing)	X	X	X	X	X	X	X						
c. Measuring Rod Trains	(See above listing)	X	X	X	X	X	X	X						
Section II: A Look For the Half-Inch	11,13		X	X	X	X			X	X				
a. Lesson 1: Measuring With the half-inch	(See above listing)		X	X	X	X			X	X				
b. Lesson 2: Using the half-inch as a unit.	(See above listing)		X	X	X	X			X	X				
Section III: Quarter-Inch Upset	13,14,16		X	X	X	X					X	X		
a. Lesson 1: Measuring with the quarter-inch.	(See above listing)		X	X	X	X					X	X		
b. Measuring the hands	(See above listing)		X	X	X	X					X	X		
Section IV: Eighth-Inch Pressure	17,15, 5,4		X	X	X	X							X	X
a. Lesson 1: Ready for big time	(See above listing)		X	X	X	X							X	X
b. Lesson 2: Measuring to the nearest unit	(See above listing)		X	X	X	X							X	X
c. Lesson 3: On your own	(See above listing)		X	X	X	X							X	X

STUDY UNIT - INCH PILL

Section I - The Inch

Lesson 1 - Measuring with the inch
Lesson 2 - Filmstrip: History of Measurement
Lesson 3 - Measuring Rod Trains
Section I - Check-up Toy or Check-up Ruler

Section II - A Look For The Half-Inch

Section II - Check-up
Lesson 1 - Measuring with the half-inch
Lesson 2 - Using ½ inch as a unit
Section II - Check-up

Section III - Quarter-Inch Upset

Section III - Check-up
Lesson 1 - Measuring with the quarter-inch
Lesson 2 - Measuring the hands
Section III - Check-up

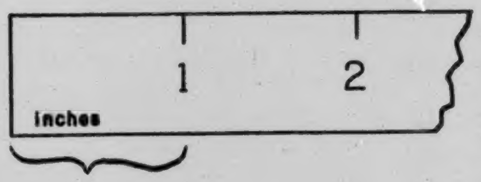
Section IV - Eighth-Inch Pressure

Section IV - Check-up
Lesson 1 - Ready for Big Time
Lesson 2 - Measuring to the Nearest Unit
Lesson 3 - On Your Own

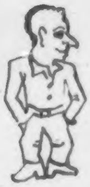
Section I The Inch

Lesson 1 Measuring With The Inch

The distance from one mark to the next on the ruler is called an inch. An inch is called a unit of linear measure.

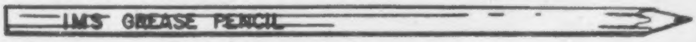


THIS IS AN INCH



Using the inch ruler we see
our little friend is about
_______ tall.

If you said one inch you are correct.



The pencil is about _________ inches.

In measuring the pencil to the nearest inch the answer would be four inches.

HELP! I didn't get my problems right. SEE YOUR TEACHER!!

IF YOU ANSWERED BOTH QUESTIONS CORRECTLY, you know how to measure to the nearest inch. To put your knowledge to the test in Inch Pill Pack #1 you will find a test envelope. Measure and record your measurements of the ten objects found in the envelope.

SHOW YOUR WORK TO YOUR INSTRUCTION TEACHER.

Lesson 2: History of Measurement

Materials Needed:

Filmstrip: History of Measurement
Filmstrip Previewer
Paper
Pencil

Instructions:

You are to view the filmstrip, "History of Measurement." Answer all questions found on the filmstrip.

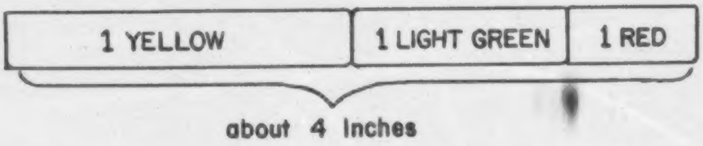
After you have corrected your paper, write your own five-question test using some of the ideas you have learned from the filmstrip. The test you will make up will be given back to you in two days to be completed by you to see how much you have learned about measurement.

Lesson 3: Measuring Rod Trains

Materials Needed

Cuisenaire Rods
Inch Ruler
Paper and Pencil

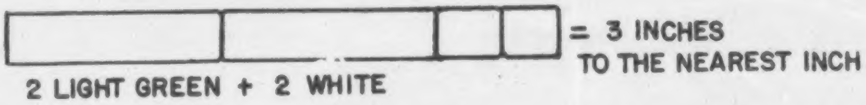
Instructions



1 - yellow + 1 - light green + 1 - red are about 4 inches long.

You are to now measure ten other rod combinations to the nearest inch.

Example:



When you have measured you 10 rod combinations--STOP. Show your results to your teacher.

Section I - Check-up Toy

Read Your Directions!

Follow Instructions!

Step I - Go to the fabric box and select large pieces of fabric, thread and needle. Your mission today is to make a small stuffed toy. (What?? I said a small stuffed toy! You can use it as a present for some small child in your home or neighborhood.)

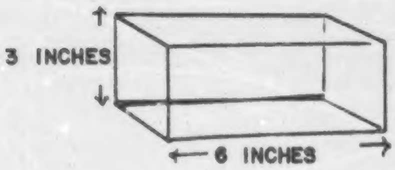
Step II - Listed below are a few ideas you can use for making your stuffed toy. Read all of the ideas please, and choose just one for now. On you own later; you can do more.

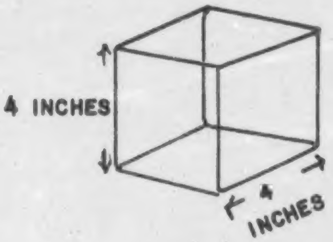
Choice 1 - If it has arms and legs . . .

a. From the top of the head to the bottom of the feet, the toy should be 8 inches.
b. From the end of one arm to the other, the arm length should be 3 inches.
c. BIG TIP ⇛ If you want a smart tip and a good looking toy → → make a simple outline of your toy idea . . . a pattern!!!
Use this pattern in cutting out your fabric. This little trick will cut out a lot of mistakes.

Choice 2 - If your toy is to be a very simple shape, use these ideas.

a. Rectangular shapes, use these measurements.





This shape
with all
edges having
the same
length.

Easy, you say!!
Warning!! Be careful!!

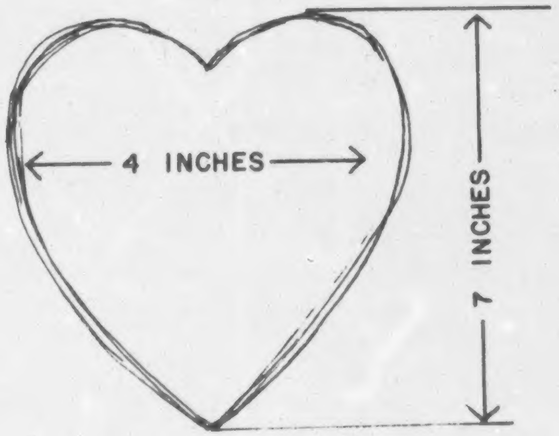
Each of these figures has several faces. Make sure you know how many faces are needed before you cut your fabric.

b. Some other shape.

If you want to create a shape of your own, make sure you use the following requirements.

1. From top to bottom, it should measure a length of 4 inches.
2. From side to side, it should measure a width of 2 inches.

Example: Heart shape



Step III - Show your completed stuffed toy to your instructional leader.
Please→ → If you used a pattern, turn it in with your toy.

Section I - Check-up Ruler

Materials Needed

Inch Pack #2
paper and pencil

1. Please pick up inch pill pack #2.
2. You will find 15 articles that must be measured to the nearest inch.

Dear Student,

When you have mastered Section I, Check-up Toy or Section I, Check-up Ruler, please move to Section II of your inch pill. Follow your directions, and you will be able to handle all your assignments.

Thank You!

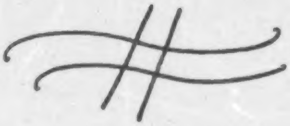
Signed,

Your Flower Friend

Section II

A LOOK FOR THE HALF INCH

"Goldie" is my pet fish. To the nearest inch is 4 inches. Knowing how to measure to the nearest inch sometimes is not enough.



Let us try to get a more exact measurement of Goldie, because he is a little more than 4 inches but less than 5 inches. He needs a new fish suit and we would like for it to fit. I think it is time to use the half inch.

TO THE STUDENT: If you know how to measure to the nearest half inch, take the Section II Check-up for Section II. Show your results to the instructional leader. If you mastered the work, move to Section III - Quarter Inch.

Section II - Check-up

Directions Below ↓↓

1. Give Goldie's measurement to the nearest half inch.

2. Measure to the nearest half inch the hands in Inch Pill Pack #3.
   a. Measure the width of each hand, then measure the length of each finger.
   b. Have your results checked by your instructional leader. Make corrections, if you have made mistakes

If you have done your best . . .
If you have a mastery score of fifteen correct answers . . .
Then you have mastered this lesson.
Therefore, you can handle ½ inch measurements.

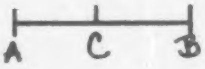
Fly now to the
quarter inch.

Lesson 1 - Measuring With the Half Inch

Materials Needed

paper
pencil

→ This is a line segment.



It is about 1 inch in length.

→This line segment AB can be divided into two equal parts line segment AC and line segment CB.

$\overline{AC}$ (line segment AC) is one-half of one inch.
$\overline{CB}$ (line segment CB) is one-half of one inch.

OR

we can say

$\overline{AC}$ = ½ inch
$\overline{CB}$ = ½ inch

→ Every inch on the ruler is or can be divided into two equal parts or ½ inches.

→Did you know that:
a. 2 inches = 4 one-half inches (½ inches)
b. 7 inches = 14 one-half inches (½ inches)

Can you find how many half-inches are in
c. 5 inches = ____________ ½ inches.
d. 11 inches = ________ ___ ½ inches.

The answer for question c is 10 half inches. The answer for question d is 22 half inches.

If you got those questions correct, you can do Lesson 2.

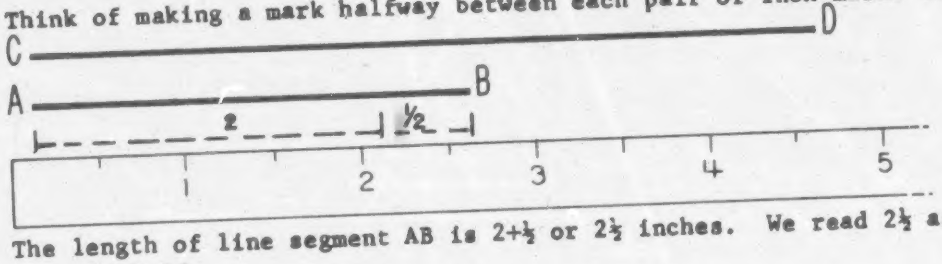
Lesson 2

Materials Needed

paper
pencil
half inch ruler

Using ½ Inch as a Unit

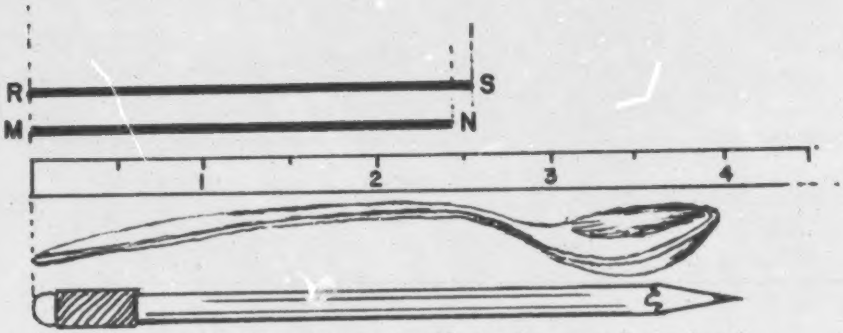
Think of making a mark halfway between each pair of inch marks on a ruler.



The length of line segment AB is 2+½ or 2½ inches. We read 2½ as two and one half.

What is the length of line segment CD?

Lesson 2 continued



Is the length of line segment RS closer to 2½ inches or 3 inches? We say that the length of line segment RS is 2½ inches, to the nearest ½ inch.

What is the length of the spoon to the nearest ½ inch? How did you decide upon your answer.

What is the length of the pencil to the nearest ½ inch? Are the spoon and the pencil exactly the same length? Are they the same length to the nearest ½ inch?

Section II - Check-up

If you have worked your way to this point, you have indicated mastery of Section II - Using the Half Inch. You are ready to have your skills tested.

Directions: Use Inch Pill Pack #3 for this test. See directions for this pack.

Section III - Check-up

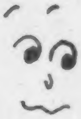
Teacher-Made Tape

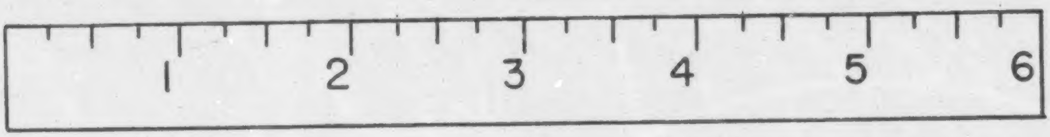
"Improving Measurement Skills" - Side 1
"Checking Your New Skills" - Side 2

Lesson 1 - Measuring With the Quarter Inch

Materials Needed

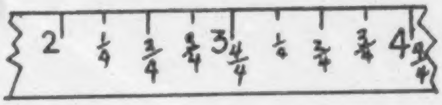
pencil





This ruler is 6 inches long. The ruler that you usually use is 12 inches long.

Each inch on this ruler has been divided into 4 parts. Each one of the parts is ¼ of an inch. Study the section of the ruler below.



1. Find one inch on the ruler.
2. Find the line which divides the inch into two equal parts. Each part is ½ inch long.
3. Find the lines which divide the inch into four equal parts. Each part is ¼ inch long.
4. How many ½ inches are there in one inch? ____________________
5. How many ¼ inches are there in one inch?____________________
6. How many ¼ inches are there in one-half inch? _______________
7. Measuring to the nearest quarter inch means to measure using what fractional part? _______________

Lesson 2

Materials Needed

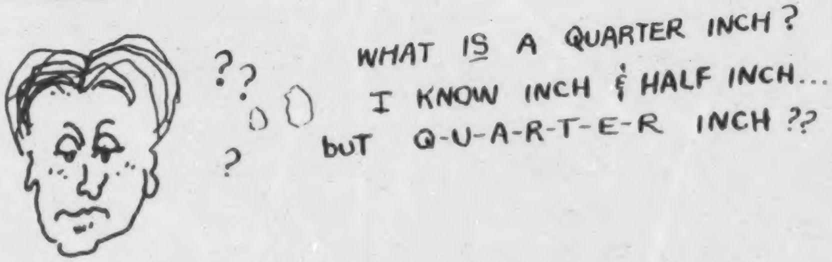
Inch Pack #3
pencil
paper
ruler with ¼ inch divisions

Directions: Using Inch Pack #3 measure the length of each finger to the nearest quarter inch and the width of each hand to the nearest quarter inch.

⇒ Record your measurements on paper and have your results checked by an instructional leader.

⇒ If you have gotten a score of at least 15 using Inch Pack #3, try the Drill Exercise on Measuring Skill. If you did not get at least 15 correct answers, your teacher will give you some help!!

Section III - Quarter Inch Upset


??
?
WHAT IS A QUARTER INCH?
I KNOW INCH & HALF INCH...
BUT Q-U-A-R-T-E-R INCH ??

Question 1. How many 25¢ pieces are there in a dollar?

Answer 1. Four (I hope you knew that!)

Question 2. What do we sometimes call the 25¢ piece?

Answer 2. Quarter, of course! (Are you still with me?)

Question 3. A $1.00 bill is equivalent to 25¢ 25¢ 25¢ 25¢ 25¢ pieces. You see we can divide the dollar in to four equal parts. One of the four parts would be how much of the whole?

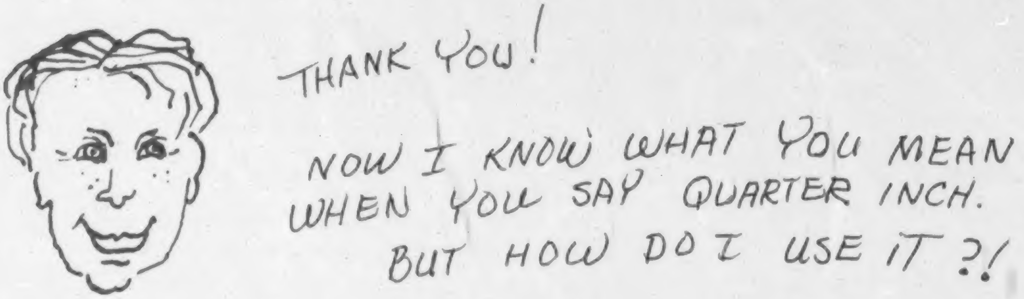
Answer 3. 1 of 4 parts is 1/4.

Question 4. Can we say that a quarter of a dollar bill is also ¼ of a dollar bill?

Answer 4. Yes, because ¼ of a dollar is 25¢ or a quarter.

Question 5. Could we say that a quarter of an inch is also ¼ of an inch.

Answer 5. I think so. LOOK!! If we divided an inch in to four equal parts, one of the four parts would be ¼ of the inch.


THANK YOU!
NOW I KNOW WHAT YOU MEAN WHEN YOU SAY QUARTER INCH.
BUT HOW DO I USE IT ?!

INCH PILL

Section IV - Eighth Inch Pressure

Section IV - Check-up

Assignment: Just how ready are you? If you can master this assignment on the first try you can pass this section by. Good Luck ☺!!

Phase I - Measure each of the different size cuisenaire rods to the nearest eighth inch.

Phase II - Make up five of your own train combinations using the rods and measure them to the nearest eighth inch.

Lesson 1 - Ready For the Big Time

Materials Needed

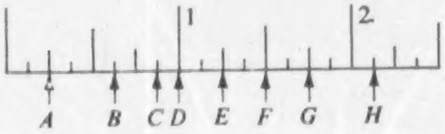
Filmstrip: Precision Measurement
Filmstrip Previewer
Record Sheet
Pencil

Assignment: At this point you have mastered measurement to the nearest inch, one half inch and fourth inch. The filmstrip, Precision Measurement, will give you needed practice in measuring to the nearest eighth inch. Follow the directions given to you in the filmstrip.

Lesson 2 - Measuring to the nearest unit

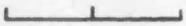
Materials Needed

paper
pencil



Measuring to the Nearest Unit

→ The length of each of these three line segments is 1 inch.

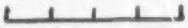
1. 

Length ____________ inch

Number of equal

Parts: ____________

Each part: ___½___ inch

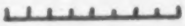
2. 

Length ____________ inch

Number of equal

Parts: ____________

Each part: ________ inch

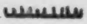
3. 

Length ____________ inch

Number of equal

Parts: ____________

Each part: ________ inch

→The length of this line segment is 1 centimeter. 

4. Length:________________centimeter. Number of equal parts:______________

Each part:____________centimeter. Each of these parts is called a millimeter.

→Write the length shown by each arrow.

SAMPLES A:___1/4___ inch 7. E:________inch SAMPLE J:___1.5___centimeters

B:___5/8___ inch 8. F:________inch 11. K:________centimeters

5. C:________inch 9. G:________inch 12. L:________centimeters

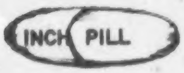
6. D:________inch 10. H:________inch 13. M:________centimeters

Lesson 3 - On Your Own

Materials Needed

paper
pencil
14 different objects
ruler

Create your own check-up from things in and aroung the room. Measure 14 items to the nearest eighth inch. Record your results and have them checked by the instructional leader.



Dear Student,

You have come to the end. Please shade in this pill if your instructional leader has indicated you have obtained mastery in the four sections of this pill. Thank You. Good Luck!

Inch Pill Pack #1

CONTENTS: 10 CUT-OUT LETTERS

DIRECTIONS: MEASURE EACH LETTER TO THE NEAREST INCH. PLEASE
RECORD ALL YOUR MEASUREMENTS.

NOTE TO THE TEACHER: SUPPLY 10 CUT-OUT LETTERS OF VARYING SIZES.

Inch Pill Pack #2

CONTENTS: INSIDE YOU WILL FIND 15 OBJECTS TO BE MEASURED TO THE NEAREST INCH.

DIRECTIONS: MEASURE EACH OBJECT TO THE NEAREST INCH. PLEASE RECORD ALL YOUR MEASUREMENTS.

NOTE TO THE TEACHER: SUPPLY 15 CUT-OUT OBJECTS IN THIS PACK.

Inch Pill Pack #3

CONTENTS: 3 HAND CUT-OUTS

DIRECTIONS:

1. MEASURE THE WIDTH OF EACH HAND
2. MEASURE THE LENGTH OF EACH FINGER

PLEASE RECORD ALL YOUR MEASUREMENTS.

NOTE TO THE TEACHER: SUPPLY 3 HAND CUT OUTS.

Reference Materials

Gundlach, Bernard H., The New Laidlaw Mathematics Program, Using Mathematics - Concepts and Computation, Workbook, p. 285, Laidlaw Company, 1970.

Herrick, Marian Cliffe, Modern Mathematics For Achievement, Second Course, Book 5, p. 13, Houghton Mifflin Company, 1967.

TEACHER-MADE TAPE LESSON

Side 1: Improving Measurement Skills
Side 2: Checking Your New Skills

Directions for making this tape are given on the following pages.

Side 1: Improving Measuring Skills

Task 1 - Locating the Quarter Inch Mark

Draw a line segment. Please make sure it is about the length of your thumb or a little longer.

To complete this tape lesson you must have:

pencil
paper
straight edge

Side one of this tape has been created to give you further study in measuring to the nearest quarter inch.

PLEASE listen carefully and follow all directions.

If you have problems, do not stop the tape until you have tried the first task.

If you have not been able to understand (a) what to do, (b) how to do it after you have tried task 1, Stop the tape!!

Instructions: Task One

Name or label the starting point of the line segment you have drawn A. Label the end point of your line segment E.

We can call the line segment you have drawn line segment AE.

Place another point on your line segment that will divide $\overline{AE}$ into about two equal parts.

Call the new point C.

Locate line segment AC. Move your finger along $\overline{AC}$.

Now locate line segment CE. Move your finger along $\overline{CE}$.

You should be able to see that $\overline{AC}$ is about one half the length of $\overline{AE}$.

Also you can see that $\overline{CE}$ is about one half the length of $\overline{AE}$.

Please draw a little vertical mark through point C.

Just for this task, we are going to let $\overline{AE}$ represent or stand for an inch. You must remember that $\overline{AE}$ is going to represent an inch.

Then the mark on point C represents the half inch mark of an inch.

Okay! Let me repeat it again. You check it out. The mark on point C divides our inch into about two equal parts. The point C is our half inch mark.

Please listen, think and then mark.

Place a point on $\overline{AC}$ that will divide $\overline{AC}$ into about two equal parts.

Label this point B. Draw a mark through point B.

Place a point on $\overline{CE}$ that will divide $\overline{CE}$ into about two equal parts.

Label this point D. Draw a mark through point D.

Now look at these line segments.

Line segment AB
Line segment BC
Line segment CD
Line segment DE

We have these four segments because we divided our inch into about four equal parts.

Remember $\overline{AE}$ represented an inch. Now the inch has been divided into about four equal parts.

Point B marks one of four parts or ¼. It locates the ¼ inch mark.

Point C marks another one of four parts. From point A to point C we have ¼ plus ¼. This means a measure of 2 of four equal parts or the 2/4 mark.

Can you see that 2/4 is also equivalent to 1/2? This means 2/4 of an inch has the same length as 1/2 of an inch. Okay?

Point D marks another one of four equal parts. From point A to point D we have ¼ plus ¼ plus ¼ or three of about four equal parts. We would call that measure 3/4 of an inch.

Point E marks another one of four equal parts. From point A to point E we have ¼ plus ¼ plus ¼ plus ¼ or four of about four equal parts. We would call that measure 4/4 of an inch. We can now see that if we had 4/4 of an inch we would have the whole inch. The whole thing!! Okay?

Task 2 - Locating the quarter inch mark on your ruler

In task 1 we used line segment $\overline{AE}$ to represent an inch, but now I want you to work with the real thing.

Please locate one inch on your ruler. Count the marks from the very beginning of your ruler to the 1 inch mark.

Count like this, the very beginning of the ruler would be zero, the first mark would be 1, the next mark 2, and so on and so forth.

If you get a count of 2 your ruler is divided into only half inches--get another ruler.

If you get a count of 4 your ruler is divided into quarter inches--too easy--get another ruler for this task.

If you get a count of 8 or 16, good! You may use that ruler for this task. If your count is not like one of the above, stop the tape. Go to your instructional leader for help.

Locate the ¼ marks on your ruler for that one inch.

For a ruler divided into eighths:

The second mark on this ruler represents ¼

The fourth mark on this ruler represents 2/4

The sixth mark on this ruler represents 3/4

The eighth mark on this ruler represents 4/4

On a ruler divided into sixteenths locate your quarter inch marks.

You will find on this ruler:

the fourth mark represents ¼ inch

the eighth mark represents 2/4 inch

the twelfth mark represents 3/4 inch

the sixteenth mark represents 4/4 inch

Task 3 - Drawing line segments

1. Draw a line segment 3/4 inches in length. Label it $\overline{AC}$.

2. Draw a line segment 2 2/4 inches in length. Label it $\overline{CE}$. Find 1 1/4" of line segment add label it D.

(The end of side 1)

Side 2 - Checking Your New Skills

Instructions: Please solve or complete each problem given.

Please work your problems as directed.

Listen to the problem. Stop the tape. Complete that problem then turn the tape on again. Work the next problem. Follow this pattern until you have worked all problems.

Problem 1

Draw a line segment having the length 3¼ inches.

Problem 2

Draw a line segment having the length 3/4 inches.

Problem 3 (Listen)

Draw line segments having the following lengths
  a. 4 3/4
  b. 2 2/4

Problem 4

Draw a square shape whose sides are 1 1/4" in length.

Problem 5

Draw a rectangular shape whose width is 2 1/4" and whose length is 5 2/4".

Inside your rectangular shape draw another rectangular shape whose width is 1 1/4" and whose length is 4 2/4".

Inside that rectangular shape draw a square whose sides measure 3/4" in length.

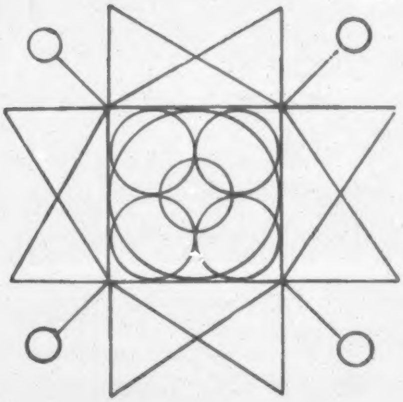
Thank You.

Give your work to your instructional leader.

(The end of Side 2)

GEOMETRY

By
Barbara H. Cutchins
IMS Mathematics Teacher
Thorpe Junior High School



Learning Objectives

If you master the activities for this study unit, you will be able to:

1. Interpret a point as an abstract idea of a location in space.
2. Identify and draw simple curves, closed and not closed.
3. Identify and distinguish between a line and a line segment.
4. Use the appropriate symbols for line and line segment.
5. Show that a line segment is a subset of a line and then label the end points of that line segment.
6. Identify parallel line segments and parallel lines.
7. Show that a ray is a subset of a line having one end point.
8. Use the appropriate symbol for ray.
9. Identify and draw an angle.
10. Demonstrate that an angle is the union of two rays.
11. Identify a plane.
12. Interpret a polygon as a closed curve.
13. Demonstrate that any two points determine a line.
14. Name and identify these terms related to the circle:
    a. radius
    b. diameter
    c. chord
    d. arc
    e. circumference
15. Name and identify terms related to polygons:
    a. base
    b. altitude (height)
    c. sides
16. Identify types of triangles in terms of their characteristics.
17. Use a compass to
    a. construct congruent line segments
    b. bisect an angle
    c. strike arcs on a circle
    d. construct congruent angles.
18. Identify and name polygons and classify by characteristics.

19. Compare various types of space figures, and classify them by characteristics.
    a. faces: shapes, number, parallel and non-parallel
    b. edges: number, parallel or non-parallel
    c. vertices: number

20. Use a compass to:
    a. Construct congruent angles
    b. Construct a triangle

21. Describe the characteristics of a polygon.

22. Distinguish among:
    a. the inside of a figure
    b. the outside of the figure
    c. the figure itself
    d. identify the region as the union of the figure itself and the inside.

23. Classify the square in terms of its characteristics--as a rectangle, a parallelogram, and quadrilateral.

24. Classify the rectangle in terms of its characteristics--as a parallelogram and a quadrilateral.

25. Draw a radius and diameter of a given circle.

26. Identify a hemisphere as half of a sphere.

27. Identify a pyramid and classify it as a space figure.

28. Match congruent figures as to size and shape.

29. Use a straight edge to:
    a. draw a line segment from end point to end point
    b. draw an angle

30. Construct circles using the compass.

Activities

Activity 1 - Vocabulary Introduction

Materials Needed:

paper
pencil
cassette recorder
dictionary
math textbook
SRA Math tapes-Tape #1, side #1
Straight edge
Tape worksheet

Define:

Use the dictionary to define the following words:

1. points
2. line
3. curve
4. plane
5. space

Now find the definition for the same words from the math textbook you have selected.

Please make sure you write down all these definitions. You will need those definitions when you complete your tape lesson.

Listen:

Get the tape recorder and Tape #1 from the SRA Math tape kit.

Complete side 1 → Points, Lines, Planes, and Space.

Stop When you have completed activity #1, show your work to your instructional leader.

Activity 2 - Rays and Angles

Materials Needed:

paper
pencil
cassette recorder
straight edge
SRA Math Tape #1, Side 2
Ray and Angles
Tape worksheet #2
protractor

Go to the materials center and get the above materials. Complete the tape lesson as directed.

Stop Give your completed assignment to your instructional leader.

Activity 3

Materials Needed:

paper
pencil
straight edge
protractor
cassette recorder
SRA Math Tape #2, Side 1
Tape worksheet #3

🚦 Go to the materials center and get the above materials. Complete the tape lesson as directed.

Stop Give your completed assignment to your instructional leader.

Activity 4 - Circles and Polygons

Materials Needed:

paper
pencil
straight edge
cassette recorder
SRA Math Tape #2, Side 2
circles and polygons
Tape worksheet #4

🚦 Go to the materials center and get the above materials. Complete the tape lesson as directed.

Stop Give your completed assignment to your instructional leader.

Activity 5 - Triangles

Materials Needed:

pencil
paper
protractor
cassette recorder
SRA Math Tape #3, Side 1
Triangles
Tape worksheet #5

🚦 Go to the materials center and get the above materials. Complete the tape lesson as directed.

Stop Give your completed assignment to your instructional leader.

Activity 6 - Quadrilaterals

Materials Needed:

paper
pencil
protractor
ruler
cassette recorder
SRA Math Tape #3, Side 2
Quadrilaterals
Tape worksheet #6

🚦 Go to the materials center and get the above materials. Complete the tape lesson as directed.

Activity 6 (Continued)

Stop Give your completed assignment to your instructional leader.

Activity 7 - Congruent Line Segments and Angles

Materials Needed:

paper
pencil
straight edge
compass
protractor

SRA Math Tape #4, Side 1
Congruent Line Segment and Angles
Tape worksheet #7
cassette recorder

🚦 Go to the materials center and get the above materials. Complete the tape lesson as directed.

Stop Give your completed assignment to your instructional leader.

Activity 8 - Perpendicular Lines

Materials Needed:

paper (unlined)
pencil
straight edge
compass
protractor

SRA Math Tape #4, Side 2
Perpendicular Lines
Tape worksheet #8
cassette recorder

🚦 Go to the materials center and get the above materials. Complete the tape lesson as directed.

Stop Give this completed assignment to your instructional leader.

Activity 9 - Transversals

Materials Needed:

unlined paper
pencil
protractor
compass
straight edge

SRA Math Tape #5, Side 1
Lines cut by a transversal
Tape worksheet #9
cassette recorder

🚦 Go to the materials center and get the above materials. Complete the tape lesson as directed.

Stop Give this completed assignment to your instructional leader.

Activity 10 - Congruent Triangles

Materials Needed:

unlined paper	SRA Math Tape #5, Side 2
pencil	Congruent Triangles
straight edge	Tape worksheet #10
compass	cassette recorder
protractor	

🚦 Go to the materials center and get the above materials. Complete the tape lesson as directed.

Stop Give the completed assignment to your instructional leader.

Activity 11 - Old Number Card Game

Directions: (Small or large group activity.) Please pick up your Old Number Game from center. Find a spot and get rid of those cards!! ☺

Object of the game: To be the first to get rid of all cards held.

Mathematics Involved: Recognition of geometric concepts and symbols.

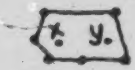
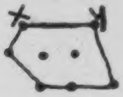
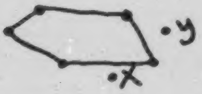
Materials Needed: One hundred one cards are made with numbers, symbols, or statements on one side. There should be fifty pairs of matching cards in different colors. Each pair may have equivalent values or problems and answers that match the symbols and expressions that are equivalent. Each pair consists of a blue card and a red card. The extra card should have the Roman number X.

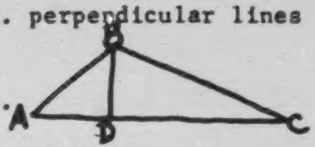
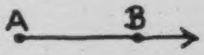
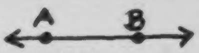
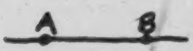
Rules: This game can be played by from seven to fourteen persons. All the cards are dealt one at a time to each player in turn. Some players will have an extra card since the dealing will not come out evenly for all groups of players. Each player matches examples and answers, shows these paris to the other players, and then places these matched pairs in the discard pile.

After the matched pairs have been discarded, the dealer takes a card from the hand of the player on his left. Of course, he must not see what card he is picking. If the card he picks matches some card in his hand, he must throw the matched pair into the discard pile. The player to the left of the dealer then takes a card from the player to his left, and so on. The game continues until some player matches his last card. He is the winner and champion. But the game continues until someone is left with only the old number--The Roman Number X.

Making your old number cards: Make a set of 50 Red-3x5 and Blue-3x5 cards and paste or write the following information on them.

Activity 11 (Continued)

Blue Cards	Red Cards
1. .	point
2. picture of a protractor	protractor
3. picture of a compass	compass
4. picture of a board compass	board compass
5. picture of a geoboard	geoboard
6. tools of geometric construction	straight edge and compass
7. circle	set of points equal distance from a central point
8. 	points x and y inside a figure
9. 	points x and y on a figure
10. 	points x and y outside a figure
11. congruence	a figure is said to be mapped onto its slide image.
12. $x^2 + y^2 = 22$	Pythagorean Relationship
13. $A = \frac{1}{2}b + i - 1$	Picks' Thereom
14. $A = \frac{1}{2}bh$	area of a triangular region
15. $A = bh$	area of a rectangular region
16. $p = 2l + 2w$	perimeter of a rectangular shape
17. $p = 4s$	perimeter of square
18. bilateral symmetry	If a flip line or reflection maps a figure onto itself, the figure is symmetric about the flip line.
19. ordered pair	coordinator
20. circumference	perimeter of a circle
21. length	one-dimensional measure

Blue Cards	Red Cards
22. area	two-dimensional measure
23. area measure	square units
24. congruent triangles	△ACB and △ACD have exactly the same size and the same shape
25. perpendicular lines	two lines intersect to form a right angle
26. 	$\overline{BD}$ is the altitude of △ABC.
27. altitude	the perpendicular line segment joining a vertex of the triangle to the line that contains the opposite side.
28.	represented by dots
29. Geometry	study of a point
30. 	ray
31. 	line
32. 	line segment
33. surface of a desk or blackboard	plane
34. simple closed figure	any figure drawn in a plane in such a way that its boundary never crosses or interacts itself and encloses part of the plane.
35. polygon	a simple closed figure formed by line segments.
36. triangle	three-sided polygon
37. quadrilateral	four-sided polygon
38. radius	a line segment joining the center of a circle with any point on the circle
39. chord	line segment joining any two points on a circle
40. diameter	a chord that passes through the center of a circle

Blue Cards	Red Cards
41. arc of a circle	part of a circle between two points
42. semi-circle	arc that is one half of a circle.
43. angle	formed when two rays have the same end point
44. vertex	common end point
45. one degree	angle formed by 2 radii which intercept an arc which is equal to 1/360 of the circle
46. equilateral triangle	a triangle whose sides all have the same measure
47. isosceles triangle	a triangle in which two sides have the same measure
48. right triangle	a triangle that contains one right angle
49. parallelogram	a quadrilateral in which opposite sides are parallel
50. parallel lines	two lines in a plane that never intersect

Activity 12 - Play a Game: Geometry Bingo

Directions: (Small or large group) You will get the Geometry Bingo set from the materials center, then begin.

Object: To be the first player to get 5 markers in a row, column or diagonal.

Mathematics Involved: Words, drawing or symbols seen or used in studying geometry.

Materials: One player card for each player. 20 to 40 call cards. Markers such as squares of paper, bottle caps, buttons, etc.

Playing the game:

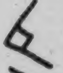
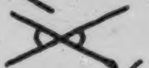
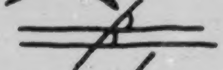
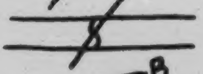
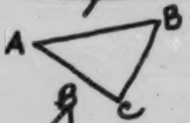
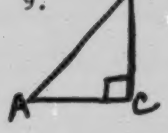
Player cards are distributed at random to members of the group. One or two player cards are given to each player. The call cards are shuffled and selected at random. Call cards should be large enough for students to read at a distance. Otherwise, the call card is read then written on the chalkboard. It is more desirable for the players to see the call card than to hear it read. Players then compute the answer and cover the appropriate space on their playing card.

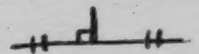
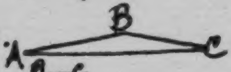
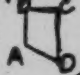
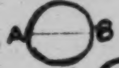
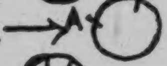
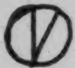
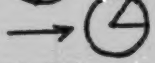
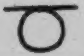
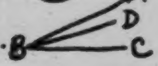
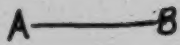
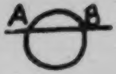
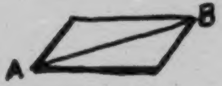
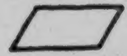
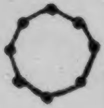
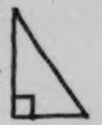
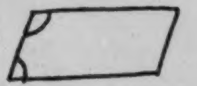
Making the game:

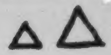
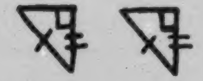
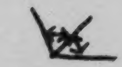
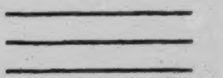
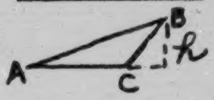
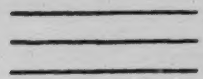
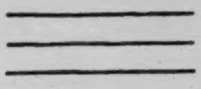
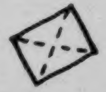
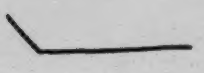
The player cards can be made up on cardboard squares or 9 x 5 inch cards. Each player card is marked into 25 cells by drawing vertical and horizontal lines. In each cell an answer to a problem is recorded. These answers should be written in a random manner so that each player card has a different arrangement of answers. This will avoid several persons getting "bingo" at the same time.

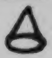
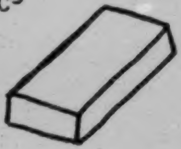
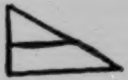
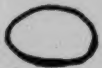
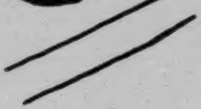
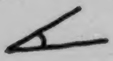
Playing Cards:

The call cards contain definitions, relationships, terms or statements to be identified.

Call Card	Board Symbol
1. equal to or greater than	1. $\geq$
2. equal to or less than	2. $\leq$
3. congruent	3. $\cong$
4. right angle	4. 
5. vertical angles	5. 
6. corresponding angles	6. 
7. alternate interior angles	7. 
8. isosceles triangle ABC	8. 
9. hypotenuse AB	9. 

Call Card	Board Symbol
10. perpendicular bisector of AB	10. 
11. symbol for parallel lines	11. ∥
12. not equal to	12. ≠
13. scaline triangle ABC	13. 
14. trapezoid ABCD	14. 
15. is similar to	15. ∼
16. diameter of a circle	16. 
17. arc of a circle	17. 
18. inscribed angle	18. 
19. central angle	19. 
20. tangent to a circle	20. 
21. adjacent angles	21. 
22. has position but no length, width, or thickness	22. A
23. has length but no width or thickness	23. 
24. secant of a circle	24. 
25. diagonal of a parallelogram AB	25. 
26. a parallelogram with equal angles and equal sides	26. 
27. pentagon	27.
28. hexagon	28.
29. octagon	29. 
30. complimentary angles	30. 
31. supplementary angles	31. 

Call Card	Board Symbol
32. two similar triangles	32. 
33. two sides and the included angle	33. SAS
34. two congruent triangles	34. 
35. bisector of an angle	35. 
36. line equidistant from two parallel lines	36. 
37. altitude h of triangle ABC	37. 
38. area of a circle	38. πr^2
39. perimeter of a circle	39. $2\pi r$
40. area of a square	40. s^2
41. area of a parallelogram	41. bh
42. area of a triangle	42. ½lh
43. perimeter of an equilateral triangle	43. 3S
44. equidistant parallel line intersect equal segments on a transversal	44. 
45. segments of a transversal intersected by parallel lines are proportional	45. 
46. the diagonals of a rhombus bisect each other at right angles	46. 
47. symbol that asks you to find one of two equal factors	47. $\sqrt{}$
48. an obtuse angle	48. 
49. a cylinder	49.

Call Card	Board Symbol
50. a cone	50. 
51. the volume of a cylinder	51. $\pi r^2 h$
52. the volume of a cube	52. c^3
53. prism	53. 
54. volume of a rectangular box	54. lwh
55. the sum of the angles of a triangle	55. 180°
56. the sum of the angles of a quadrilateral	56. 360°
57. a line parallel to the base of a triangle and equal to ½ the base	57. 
58. ellipse	58. 
59. parallel lines in perspective	59. 
60. acute angle	60. 

Activity 13 - Geometry Tic-Tac-Toe

Directions:

Players: You will need just one friend to play this game.

Materials Needed:

Tic-Tac-Toe Geometry Game
General Mathematics Text for reference

Rules: This game is played on the usual tic-tac-toe pattern of nine cells. Players receive an X or O in a given cell if they can answer questions, problems or definitions correctly. Each cell is labeled according to the type of problem or question to be answered. Each player in turn selects a topic in the traditional "X" or "O" mark. If he fails to answer a question correctly, his opponent may attempt the same question or select a topic in a different cell. Several questions may be needed for each cell so that the game can continue until one player has three marks in a line.

Construction: Materials - 4 sections of tagboard 10" x 10" and magic markers.

Sample Card
Game question: Describe the properties of these figures or solids.

Trapezoid ☐ ☐	Dodecahedron ☐ ☐	Pentagon ☐ ☐
Pyramid ☐ ☐	Square ☐ ☐	Quadrilateral ☐ ☐
Octagon ☐ ☐	Hexagon ☐ ☐	Heptagon ☐ ☐

NOTE: Other cards can be prepared dealing with formulas, defining terms or describing the properties of other figures or solids.

Activity 14 - Geometry Basketball

Directions:

Players: Geometry basketball is played with two teams. The captains act as team leaders and referees check the solutions and administer penalities. Points are made by solving problems written by the teacher. The record of points is tallied by a score keeper.

Materials Needed:

Geometry Basketball Game

Rules: Players are selected in turn by the captain to shoot baskets by solving problems. If a player solves a problem presented by the captain of the opposing team, one or two points are scored depending on the difficulty of the problem. If a problem is solved incorrectly, a member of the opposing team must solve it to gain possession of the ball. All players must have a turn solving a problem before one is selected a second time. The players on each team take turns solving problems whether for a basket or to gain possession of the ball. Fouls are called for unsportsmanlike conduct and result in one or two free throws. The length of the game is usually given a time decided in advance.

Construction: No special board or card is needed for this game. However, you need to make a set of game question cards.

Write each question on a 3" x 5" index card. A one or two point value will be assigned to each card depending upon difficulty.

Game Questions

1. What is the formula for the area of a rectangle?

2. What is the formula for the area of a square?

3. What is the formula for the area of a triangle?

4. What angles are equal when parallel lines are cut by a transversal?

5. Figures are congruent when what conditions exist?

6. What are two characteristics of a point?

7. Define line.

8. Define line segment.

9. Show the symbol used for a line.

10. Show the symbol used for a line segment.

11. Define ray.

12. Show the symbol used for a ray.

13. Give one or more properties of space.

14. What are co-linear points?

15. What are coincident points?

16. Define skew line.

17. Define parallel line.

18. Define angle.

19. What is the common end point of two rays called?

20. When two lines intersect, the pair of opposite angles formed are called ________________.

21. What is a closed curve?

22. What is a simple closed curve?

23. Identify or describe a canvex polygon.

24. Identify or describe a concave polygon.

25. Polygons with four sides are called ________________.

26. Polygons with five sides are called ________________.

27. Polygons with six sides are called ________________.

28. Polygons with seven sides are called ________________.

29. Polygons with eight sides are called ________________.

30. Polygons with nine sides are called ________________.

31. Polygons with ten sides are called ________________.

32. A segment connecting any two non-adjacent vertices is called a ____________ of the polygon.

33. Define tetrahedron.

34. Define or illustrate the term "face".

35. Define or illustrate the term "edge".

36. Define pyramid.

37. Locate or describe the apex of a pyramid.

38. Define or locate the exterior of an angle.

39. Define or locate the exterior of a triangle.

40. What is the study of Geometry?

Activity 15 - Checko Geometry

Directions:

Players: Just you and a friend will do for this game.

Materials Needed:

Checko Geometry Game

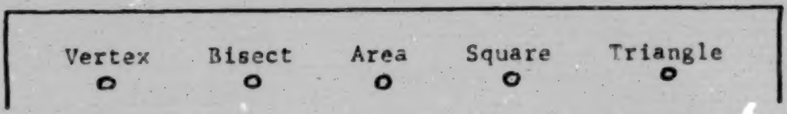
Rules: The object of this game is to get four pegs in a row. Players take turns in placing their pegs or markers on the board. When a player places a peg on the board he must give the correct answer to the expression at that hole. If he gives an incorrect answer he must remove his peg. After all pegs have been placed on the board, players continue to take turns moving the page one space vertically, horizontally, or diagonally until one player wins by getting four pegs in a row.

Peg Board Words - These words are to be placed on the board to be defined by players.

Construction: The boards for Checko Geometry should be square with 5 holes or 5 squares on each side. Hookboard or accoustical ceiling tile is a convenient material to use. Boards with squares can also be drawn on cardboard.

Each space on the board will be labeled with a word to be defined. If several boards are available players can use them according to their ability.

Sample section of Checko Board
5 rows and 5 columns



Checko Board Words

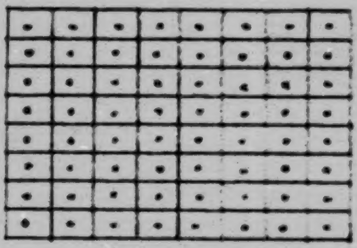
1. radius
2. diameter
3. circle
4. semi-circle
5. rectangle
6. square
7. triangle
8. parallelogram
9. cube
10. right angle
11. obtuse angle
12. acute angle
13. protractor
14. compass
15. bisect
16. area
17. perpendicular
18. trapezoid
19. vertex
20. hexagon
21. polygon
22. pentagon
23. congruent
24. heptagon
25. scalene triangle

Activity 16 - Left Out

Object: To be the last player to draw a line segment.

Mathematics involved: Finding a strategy that wins.

Materials Needed: A grid of squares 8 x 8 such as example shown.



Rules:

1. This is a game for 2 players.
2. Players take turns drawing a line segment from the center point of one cell to the center point of an adjoining cell either vertically, horizontally, or diagonally.
3. The line segment must begin and end on an unusual cell.
4. The line segment must not cross another line segment.
5. Players continue to take turns until no pair of adjoining cells is remaining.
6. The player who draws the last segment wins.

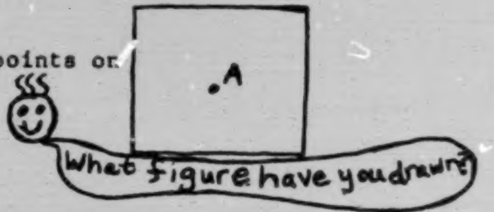
Activity 17 - Finding Circles, Parallel Lines and Angle Bisectors

Materials Needed:

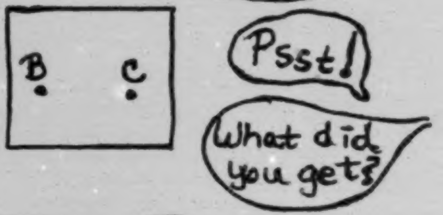
paper pencil
compass ruler

Directions: Please follow directions. Make sure you complete your drawing and answer all questions.

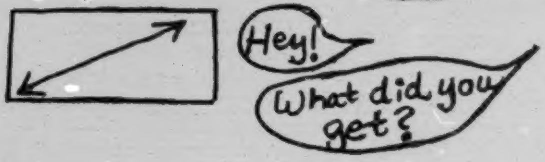
1. Draw a point and label it "A". Now draw all points on your paper which are 1 inch from point A.


A
What figure have you drawn?

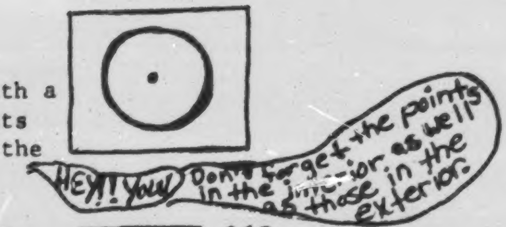
2. Draw two points B and C on your paper. Now draw all the points on your paper which are the same distance from B as they are from C.


B
C
Psst!
What did you get?

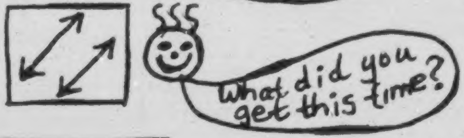
3. Draw a line. Now draw all points on your paper which are 1 inch from the line.


Hey!
What did you get?

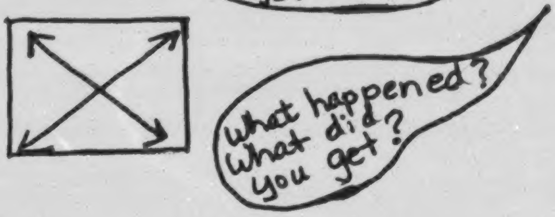
4. Use your compass to draw a circle with a 2 inch radius. Now find all the points on your paper which are 1 inch from the circle.


HEY!! You
Don't forget the points in the interior as well as those in the exterior.

5. Draw two parallel lines on your paper. Now draw all points on your paper which are the same distance from both lines.



6. Draw two crossing lines. Now draw all points on your paper which are the same distance from both lines.



Dear Student,

As soon as you complete this exercise, please give your completed assignment to your instructional leader.

Thank you.

Signed,
A Friend

Activity 18 - Regular Hexagons

Mathematics involved: construction of regular hexagons

Materials Needed:

paper	compass
pencil	straight edge

Directions: After you have assembled all your equipment, follow each instruction carefully.
Once you have completed your work, give your completed assignment to your instructional leader.

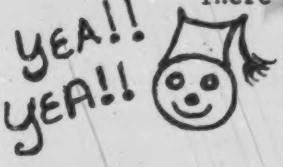
Step 1. Draw a circle having a two inch radius.

Step 2. Be sure to keep your compass points 2 inches apart. Now place your compass at any point on the circle. Mark a point on the circle.

Step 3. Move your compass point, point to the point you just marked. Now mark another point on the circle.

Step 4. IMPORTANT!! Repeat Step 3 until you get back to where you started. Make sure you leave the compass points two inches apart.

Step 5. Connect the points you marked on the circle with line segments. There should be six line segments when you complete this step.



I am to announce that the figure you have just drawn is called a regular hexagon. Notice, please, that a regular hexagon has 6 sides of the same length and 6 angles of the same size.

Step 6. Create a design of your own using regular hexagons. HINT!!! Follow steps 1 through 5.

Activity 19 - Designs

Mathematics involved: Creating geometric designs using compass and straight edge.

Materials Needed:

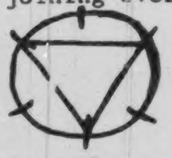
paper
pencil
compass
straight edge
colored pencils

Directions: After you have assembled all your equipment, follow each instruction carefully. Once you have completed your work, give your completed designs to your instructional leader.

Part I. The Star

Step 1. Draw a circle having a radius of 2 inches. Divide the circle into 6 parts.

Step 2. Draw a triangle by joining every other point. See example below.

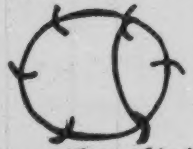


Step 3. Draw another triangle. When you finish, you will have a star design.

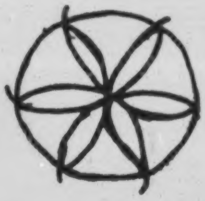
Part II. The Flower

Step 1. Draw a circle having a radius of 2 inches. Keeping your compass points 2 inches apart, divide the circle into 6 parts.

Step 2. Leave your compass points 2 inches apart. Put your compass on one of the points that you drew in Step 1. Now draw an arc (part of a circle) inside the circle like this:



Step 3. Repeat Step 2 at each of the other points. When finished, you should have this flower design. (See next page.)



Part III. On Your Own

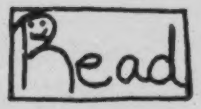
Do your own thing using the star and the flower. Show just how creative you can be when you get the chance.

Activity 20 - Parallelogram

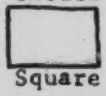
Mathematics Involved: Identifying the properties of a parallelogram.

Materials Needed: pencil

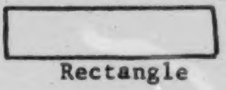
Directions: Please read all given information and answer all questions. When you have completed this assignment, give it to your instructional leader.



You should know these four-sided figures.

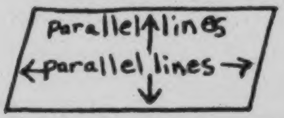


Square



Rectangle

Another four-sided figure is a parallelogram.

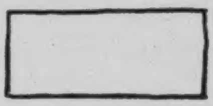


A parallelogram is a four-sided figure with opposite sides parallel.

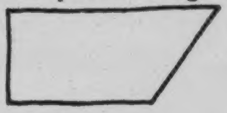
Quick Check

1. Which of the figures are parallelograms?

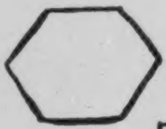
a.



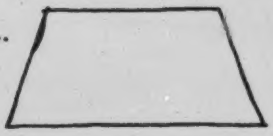
b.



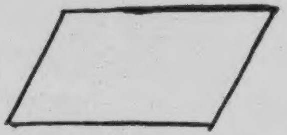
c.



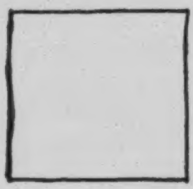
d.



e.



f.



2. a. Are all squares parallelograms?
   b. Are all parallelograms squares?
   c. Are all rectangles parallelograms?
   d. Are all parallelograms rectangles?

Activity 21 - Building Models

Mathematics Involved: Making geometric models

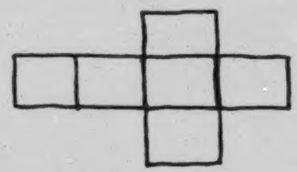
Materials Needed:

paper	glue or paste
scissors	ruler

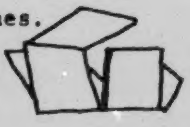
Directions: Trace these figures and make models from your tracing or blow up your tracing and make models from the larger tracing.

As soon as you have your tracings, simply follow these easy steps.

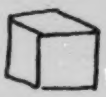
Step 1 Cut the shape out.



Step 2 Fold the shape along these lines.



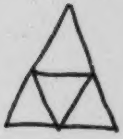
Step 3 Make this model.



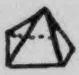
You are to build these models and answer the questions.

Before you cut out and fold your figures match them with these models.

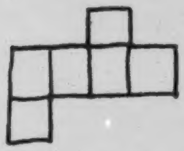
1.



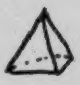
a.



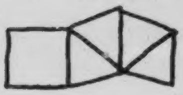
2.



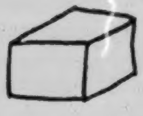
b.



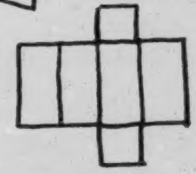
3.



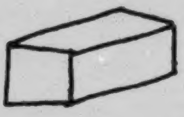
c.



4.



d.



Please give your completed models to your instructional leader.

Activity 22 - Bisecting An Angle

Mathematics Involved: Bisecting an angle

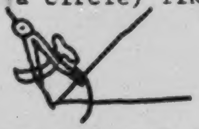
Materials Needed:

pencil
paper
protractor
compass
straight edge

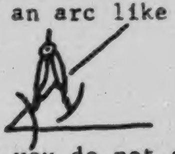
Directions: Please follow instructions carefully. After you have completed your work, give completed work to your instructional leader.

Step 1 Use your protractor to draw a 30° angle.

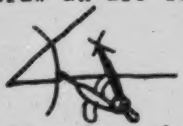
Step 2 Place your compass point on the vertex of the angle. Then draw an arc (part of a circle) like this:



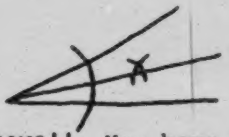
Step 3 Place your compass point where the arc crosses one side of the angle and draw an arc like this.



Step 4 Make sure that you do not change the setting of your compass. Now place your compass point where the arc crosses the other side of the angle and draw an arc like this:



Step 5 Now draw a line from the vertex through the point where the arcs cross.



Step 6 CONGRATULATIONS!! You have bisected the angle you drew in Step 1. If you like, you can measure the two new angles.

Please do me a favor.

Go get your math book or dictionary and write down the definition of bisect in reference to what you just did.

Bisect: ______________________________

____

____

Very good! Thank You. ☺

Step 7 More practice. Draw another angle and bisect it.

Activity 23 - Polygons

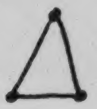
Mathematics Involved: Studying the properties of certain polygons.

Materials Needed:

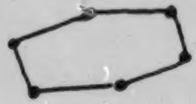
paper
pencil

Directions: Read!! Read all information carefully and answer questions. Give completed assignment to your instructional leader.

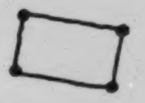
All of these figures are polygons.



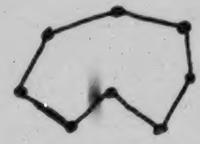
Triangle
(3-sided)



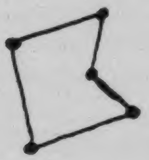
Hexagon
(6-sided)



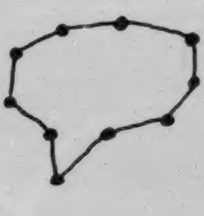
Quadrilateral
(4-sided)



Octagon
(8-sided)

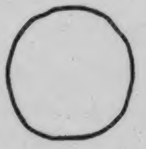


Pentagon
(5-sided)



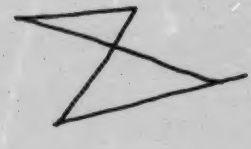
Decagon
(10-sided)

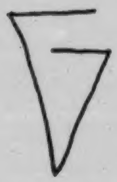
These figures are not polygons.



Does not have straight sides.

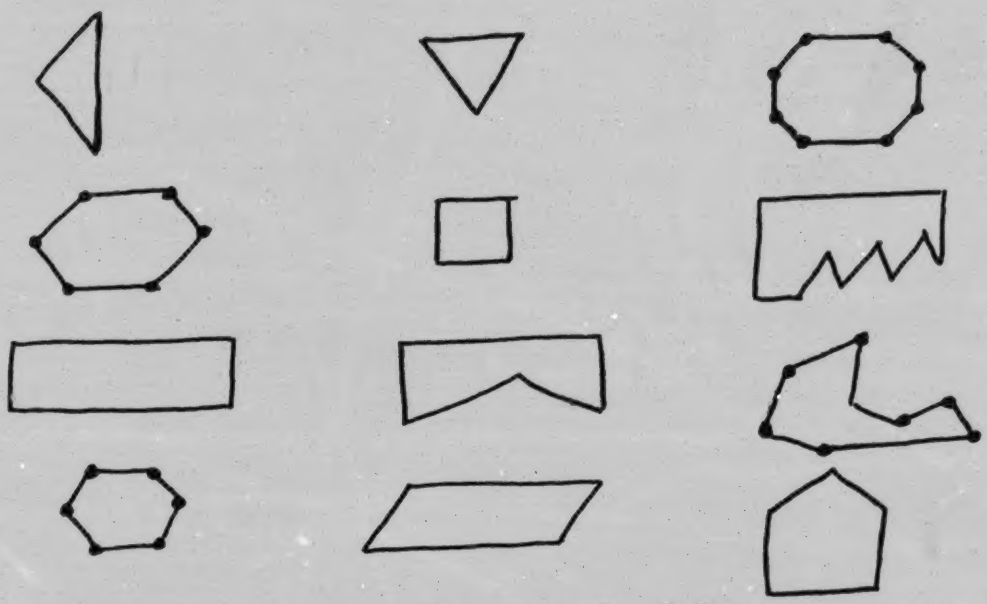
Sides cross.





Not closed.

Thw twelve figures drawn below are all polygons.



Please answer the following questions using the 12 figures.

1. Which of them are triangles?
2. Which of them are quadrilaterals?
3. Which of them are pentagons?
4. Which of them are hexagons?
5. Which of them are octagons?
6. Which of them are decagons?

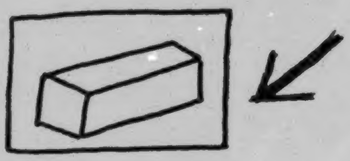
Activity 24 - Solid Fun

Mathematics Involved: Recognizing properties of certain solids.

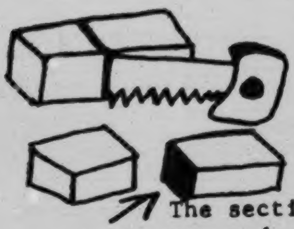
Materials Needed:

paper
pencil

Directions: READ!! Read all information carefully and give completed assignment to your instructional leader.



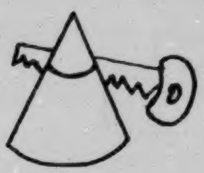
This is a solid figure.

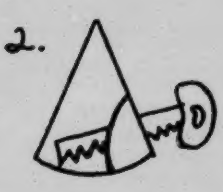


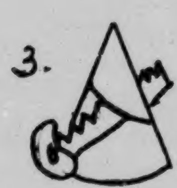
Imagine cutting through the solid figure like this.

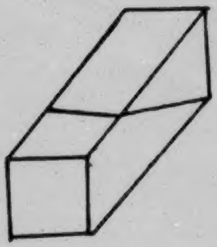
The section marked with the arrow, where the cut was made, would look like this.

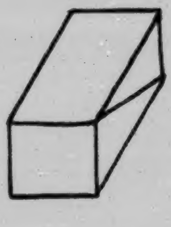
READ AND DO - Cut these solids as shown. Match them with their sections.

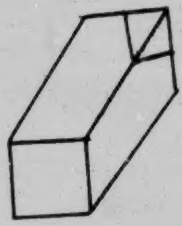
1. 

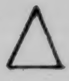
2. 

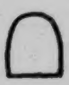
3. 

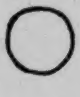
4. 

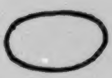
5. 

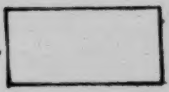
6. 

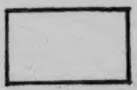
a.  ______

b.  ______

c.  ______

d.  ______

e.  ______

f.  ______

ity 25 - Circles and Quadrilaterals

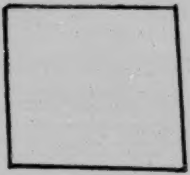
Mathematics Involved: Drawing an inscribed circle and a circumscribed circle.

Materials Needed:

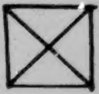
paper
pencil
ruler
compass

Directions: Please follow your directions carefully and give your completed assignment to your instructional leader when you are finished.

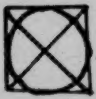
Step 1 Trace this square carefully. Use a ruler to get straight sides.



Step 2 With your ruler draw two diagonals.

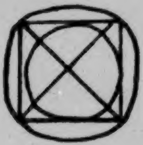


Step 3 Use the point where the diagonals cross as center. Draw a circle inside the square which touches all four sides.



This is an inscribed circle.

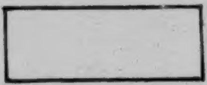
Step 4 Use the same point as center. Draw a circle outside the square which goes through the four corners.



This is a circumscribed circle.

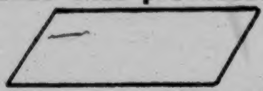
Please complete the following exercise.

1. a. Trace this rectangle carefully.



   b. Draw its two diagonals.
   c. Try to draw an inscribed circle.
   d. Try to draw a circumscribed circle.

2. a. Trace this parallelogram carefully.



   b. Draw its two diagonals.
   c. Try to draw an inscribed circle.
   d. Try to draw a circumscribed circle.

Activity 26 - The Point Of It

Mathematics Involved: Comparing the number of points to the number of line segments.

Materials Needed:

paper
pencil
straight edge

Directions: READ!! Please read all information. Answer questions and complete charts and statements.

Step 1 Here are two points.

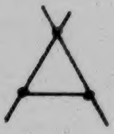
Step 2 We have connected the pair of points with a line.

2 points → 1 line

Step 3 Here is a 3rd point (not on the line).

3 points

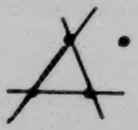
Step 4



We have connected each pair of points with a line. Notice that this gives 2 new lines. The 3rd point adds 2 new lines--3 lines altogether.

We will continue adding one point (not on any line already drawn) at a time. You will complete the charts. If you need to, make your own drawings.

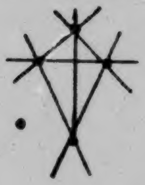
1. A point has been added to the drawing in step 4.



Four points

   a. The 4th point adds _____ new lines.
   b. _____ lines altogether.

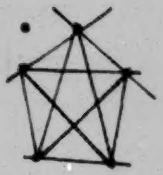
2.



Five Points

   a. The 5th point adds _____ new lines.
   b. _____ lines altogether.

3.



Six Points

a. The 6th point adds _____ new lines.
b. _____ lines altogether.

4. Copy and complete this table.

Points	New Lines Added To Drawing	Lines
2		1
3	2	3
4	3	6
5		
6		
7		

5. Look carefully at your completed table. Can you guess a rule for finding the number of lines? ______________________________

____

6. Here are two more rows of the table. Copy and complete.

24	23	276
25		

Psst!! If you are really finished, give your work to your instructional leader.

Activity 27 - Bisector of a Line Segment

Mathematics Involved: Bisecting a line segment using a ruler

Materials Needed:

pencil
paper
ruler

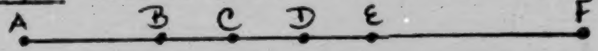
Directions: Please follow instructions. After you have finished your work, give your completed assignment to your instructional leader.

Step 1 Draw a 4-inch segment on your paper. Label it: $\overline{AB}$

Step 2 Use your ruler to find the point which is 2 inches from each end point of the segment. Label it Point C.

Point C is called the mid point of segment AB. Point C bisects segment AB.

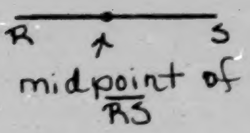
Step 3 True or False? You can use a ruler to check your answers.

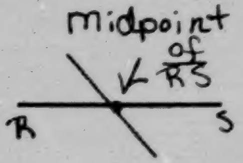


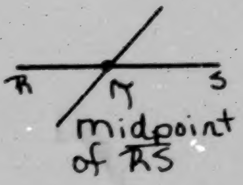
a. Point C is the mid point of segment AD.
b. Point B is the mid point of segment AD.
c. Point B is the mid point of segment DA.

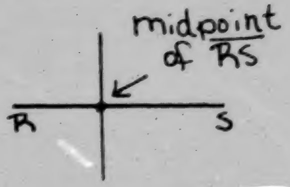
d. Point E bisects segment AF.
e. Point E bisects segment FB.
f. Point D bisects segment CE.

Step 4 These pictures show some bisectors of the line segment RS.


R
S
midpoint of $\overline{RS}$


midpoint of $\overline{RS}$
R
S


R
S
midpoint of $\overline{RS}$


midpoint of $\overline{RS}$
R
S

Activity 28 - Perpendicular Bisector

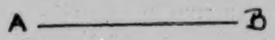
Mathematics Involved: Finding the perpendicular bisector of a line.

Materials Needed:

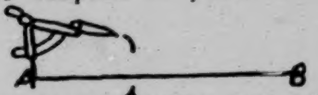
pencil	compass
paper	straight edge

Directions: Please follow directions. After you have finished your work, give your completed assignment to your instructional leader.

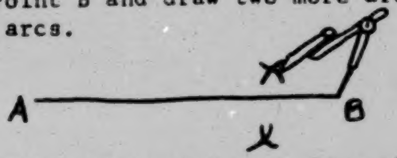
Step 1 a. Draw $\overline{AB}$ on your paper.



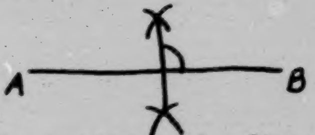
b. Put your compass at point A and draw two arcs.



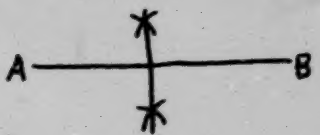
c. Be sure not to change your compass setting. Put the compass point at Point B and draw two more arcs. Be sure they cross the other arcs.



d. Use a straight edge and draw a line through the crossing points of the arcs.



e. Notice the right angles in the figure. How many right angles are there?



Step 2 Is the line segment you drew in Step 1-d a perpendicular bisector of line segment AB?

Step 3 Draw a line segment on your paper and label it "XY". Use your compass and a straight edge to draw a perpendicular bisector of line segment XY.

Activity 29 - Drawing A Parallelogram

Mathematics Involved: Constructing a parallelogram

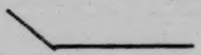
Materials Needed:

pencil	compass
paper	straight edge

Directions: Please follow instructions. After you have completed your work, give your completed construction to your instructional leader.

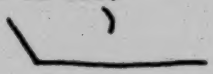
Step 1 Draw a line segment for one side.

Step 2 From one end of the line segment draw another side.



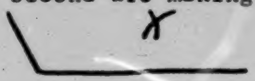
Step 3 Use your compass to measure one side.

Step 4 Draw an arc.

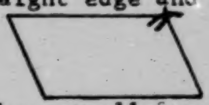


Step 5 Use your compass to measure the second side.

Step 6 Draw a second arc making sure the two arcs cross



Step 7 Use a straight edge and draw the other two sides.



Step 8 Draw another parallelogram. Hint: Use the same steps.

Activity 30 - Drawing A Rectangle

Mathematics Involved: Constructing a rectangle.

Materials Needed:

pencil	compass
paper	straight edge

Step 1 Draw a segment for one side.

Step 2 Use a square corner of your straight edge (or book) to draw a perpendicular line segment.

Step 3 Now complete as you did the parallelogram. (See Activity 29 - For constructing a parallelogram)

Step 4 Draw another rectangle.

Step 5 Draw a square.

Activity 31 - Radius and Diameter

Mathematics Involved: Studying the relationship of the radius and diameter.

Materials Needed:

pencil	compass
paper	straight edge

The distance from the center to the circle is called the radius of the circle.

The distance across the circle through the center is called the diameter of the circle.

Step 1 a. Set your compass points 1 inch apart.

b. Draw a circle having a radius of 2 inches.

c. What is the diameter of the circle?

Step 2 a. Draw a circle having a radius of ½ inch.

b. What is the diameter of that circle?

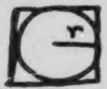
Step 3 a. Draw a circle having a diameter of 2½ inches.

b. What is the radius of that circle?

Step 4 Complete.

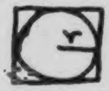
	radius	diameter
a	1 inch	
b		4 inches
c	½ foot	
d		½ foot
e	r	
f		d

Step 5 The radius of the circle is r.



What is the length of one side of the square?

Step 6 The radius of the circle is r.



What is the length of one side of the hexagon?

Finished?? Give your completed assignment to your instructional leader.
Thank You!

Activity 32 - Circumference of a circle

Mathematics Involved: Studying the circumference of a circle.

Materials Needed:

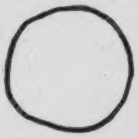
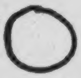
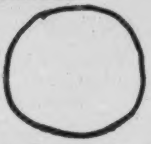
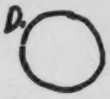
paper
pencil

Directions: Please follow directions. After you have finished your work, give your completed assignment to your instructional leader.

READ!! The circumference of a circle is the distance around the circle.

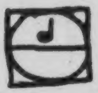
The circumference of a circle is similar to the perimeter of a polygon.

Complete this exercise please.

A.

B.

C.

D.


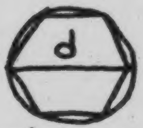
1. Which circle has the largest diameter?
2. Which circle has the largest circumference?
3. Which circle has the smallest diameter?
4. Which circle has the smallest circumference?

5. The diameter of the circle is d.



   a. What is the length of one side of the square?
   b. What is the perimeter of the square?
   c. Is the perimeter of the square less than or greater the circumference of the circle?

6. The diameter of this circle is d.



   a. What is the length of one side of the hexagon.
   b. What is the perimeter of the hexagon?
   c. Is the perimeter of the hexagon less than or greater than the circumference of the circle?

7. Is the circumference of the circle closer to the perimeter of the square in number 5 or the perimeter of the hexagon in number 6?

Activity 33 - Create A Design

Mathematics Involved: Using the circumference, radius, diameter, and center of a circle to create designs.

Materials Needed:

paper
pencil
ruler
protractor
compass
colored pencils

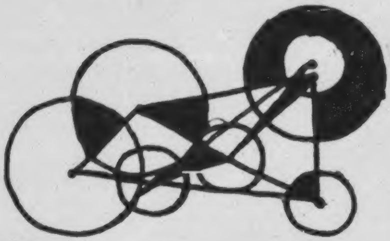
Directions: Please follow instructions. After you have completed your work, give your completed design to your instructional leader.

Step 1 On a large piece of plain paper draw as many circles as you wish. They may overlap.

Step 2 Connect the centers of the circles.

Step 3 Color in any of the regions you wish to make a modern art design.

Simple Example



Studying Your Design

1. Count the number of triangles, circles, and rectangles in some portion of your design.
2. Count the points of intersection in some portion of your design. Label each one you count.

3. What shapes are in your pattern?
4. Make a list of some ways the phrase "points of intersection" is used.
5. Define circumference, radius, and diameter of a circle.
6. Make a mod art sculpture, using only circles you have cut of cardboard.

Activity 34 - Unscramble The Shapes

Mathematics Involved: Construction practice using the tools of Geometry. Further study of regions, shapes, points, line segments, vertices, and points of intersection.

Materials Needed:

paper	ruler
pencil	compass

Directions: Please follow instructions. After you have completed your work, give completed design to your instructional leader.

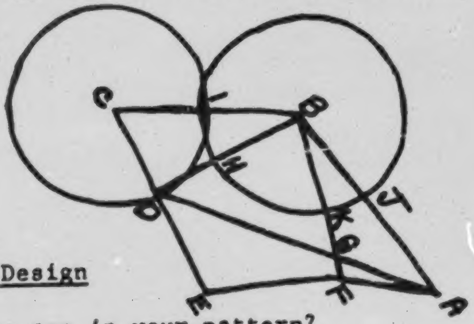
Step 1 On a sheet of plain paper make a pattern of circles and straight lines.

Step 2 Label all vertices and points of intersection.

Step 3 Find and name different regions of your pattern.

Step 4 If you do not know the names, look them up in a mathematic book.

Simple Example



Studying Your Design

1. What shapes are in your pattern?
2. Show and explain to me a vertex, a point of intersection, and a line segment.
3. Where in the environment do you find vertices and points of intersection?
4. Color sections of your pattern to make an abstract painting.
5. Use circles and straight lines to make strange, imaginary animals.
6. Make a geometric figure book. Define and illustrate a line, line segment, ray, angle, and curve.
7. Make three-dimensional figures out of cardboard.
8. Draw and define the different types of angles.

Activity 35 - Looking At Geometric Models

Mathematics Involved: Recognizing the properties of geometric solids through manipulation and discovery.

Materials Needed:

paper
pencil
one set of Geometric solids

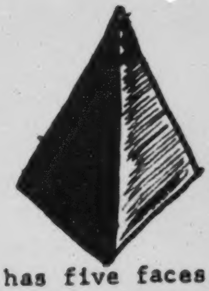
Directions: Please follow instructions. After you have finished your work, give your completed assignment to your instructional leader.

Step 1 Look at the example. Each geometric model can be described in the same way.

Step 2 Describe each of the other models and write their descriptions on your work paper.

Step 3 Could you show descriptions on a chart? Do it now.

Example



1. The model has five faces.
2. Four of the five faces are triangles, one face is a square.
3. Each of the triangular faces has three sides and three vertices.
4. The square face has four sides and four vertices.
5. The triangular faces have a vertex in common.

Further Study:

1. Which shape was the easiest (or hardest) for you to describe?
2. Which shapes have similar properties?
3. List places where you find shapes like these.
4. Use the models to form three-dimensional objects.
5. Build a set of models from paper.

Activity 36 - Balancing Triangles

Mathematics Involved: Exploring triangles and using ther terms median and encircle.

Materials Needed:

paper
pencil
ruler
protractor
compass

Directions: READ!! Read all information carefully and answer questions. Give completed assignment to your instructional leader.

Step 1 Draw three points on a piece of stiff cardboard. Connect them with line segments. Was a triangle formed?

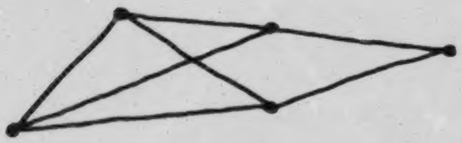
Step 2 Draw two more triangles on the cardboard. Measure the sides of each triangle carefully. Find the mid point of each side of each triangle. Connect each mid point to the vertex opposite the sides (see the example.)

Step 3 Did you do this work very carefully? Do you notice anything about the three line segments (called medians) you drew in each triangle?

Step 4 Balance each triangle on a small flat surface such as the eraser end of a pencil. Could you balance each one? At what point did the triangle balance?

Step 5 Using the balance point as the center, can you draw a circle that touches each side of the triangle at only one point? Such a circle would be called an encircle. Can you make a mobile with your three triangles?

Example



Further Study:

1. What did you discover when you did this activity?
2. How long is the shortest line segment to any side of the triangle from th point where two medians meet?
3. Define the word triangle.
4. Construct and label different types of triangles.
5. List the properties of different types of triangles.
6. Make a mobile from triangular shapes.
7. Draw the outline of each geometric model that has triangular faces.

Activity 37 - Rotations

Mathematics Involved: Studying solids made by rotating flat shapes. Distinguishing between the properties of two dimensional shapes and the three dimensional figure that can be made for them.

Materials Needed:

paper
pencil
set of flat geometric shapes

Directions: Please follow instructions. After you have completed your work, give your completed design to your instructional leader.

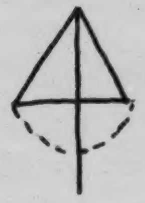
Step 1 Hold each flat shape on edge. Imagine that there is a line running through the shape in the same plane as the shape. Rotate (turn) the flat shape about this line (see example).

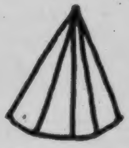
Step 2 Draw and name the three-dimensional solid (shape) you have generated (made) by the rotation.

Step 3 Generate (make) as many different three-dimensional solids as you can by changing the position of the lines about which you rotate each flat shape. Make sure that the line is in the same plane as the shape.

Step 4 What new shape can you generate by moving the line outside the flat shape but still in the same plane?

[illegible]





Cone

Further Study:

1. What shapes did you generate?
2. Does this activity help you understand the sphere, the cone, and the cylinder? Explain.
3. List places where you find rotation.
4. Which flat shapes were needed to generate three-dimensional models?
5. Make a flat shape of your own. What three-dimensional object can you generate?
6. What shapes are generated by rotating the different types of triangles around a line through one vertex?
7. Define ellipse. What shape is generated by rotating an ellipse?
8. Make a set of geometric models from cardboard or clay.
9. Define rotation, translation, tessellation, symmetry, and generate (as we have used these terms in this activity)

Activity 38 - Tessellations

Mathematics Involved: Filling a space with non-overlapping objects. Basic experiences with symmetry, shape recognition and congruency.

Materials Needed:

paper	set of flat geometric shapes
pencil	colored pencils

Directions: Please follow instructions. After you have completed your work, give your completed design to your instructional leader.

Step 1 Take any flat shape.

Step 2 Make a pattern on a sheet of paper by drawing an outline of the shape again and again. The pattern should cover most of the sheet of paper. There should be no gaps in the pattern, and the outlines should not overlap. Such a pattern is called a Tessellation.

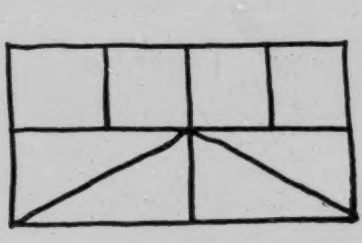
Step 3 Draw five more tessellations. Use different flat shapes.

Step 4 Now make a tessellation of more than one shape.

Step 5 When you have finished, color each set of congruent (identical) shapes a different color.

Step 6 What other shapes could you use to make interesting tessellations?

Example



Further Study:

1. Name the shapes that you used.
2. What is congruency? What is symmetry?
3. Outline the perimeter of your pattern.
4. Make an interesting painting from tessellations.
5. List places where you have seen tessellations.
6. Cut a shape from half a potato. Stamp out a pattern, using the potato and ink or paint. Is your pattern a tessellation?
7. Arrange the cubes in different three-dimensional patterns.
8. Fill some portion of three-dimensional space with cubes.
9. Fill some portion of three-dimensional space with geometric models other than cubes.
10. Make an interesting pattern from the outline of your hand.

Activity 39 - Drawing the Shapes

Mathematics Involved: Describing geometric solids by means of orthographic views. Such as shape recognition, roundness and flatness.

Materials Needed:

paper
pencil
one set of geometric solids

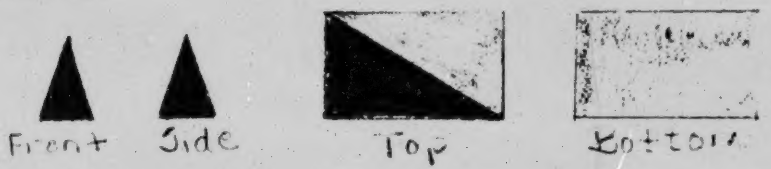
Directions: Please follow instructions. After you have finished your work, give your completed assignment to your instructional leader.

Step 1 Name each model.

Step 2 Draw each model as though you were looking at it closely from the front. Then draw it as though you were looking at it from each of its other sides, from the top, and from the bottom (see example)

Step 3 Draw other objects (such as a book or a desk) in the same way.

Example



Further Study:

1. Which model was the most difficult to draw? Why?
2. Select a model and ask, "How would you describe this?"
3. Select a model and ask, "What is the name of this shape?"
4. Discuss perspective. Have an art lesson on perspective.
5. Draw the front, side, top and bottom of an object. Have friends guess what it is.
6. Discuss ways in which different views of different objects might be used.
7. Draw a friend. Show the front, side, top and back.

Activity 40 - Identical Triangles

Mathematics Involved: Developing the concept of congruency.

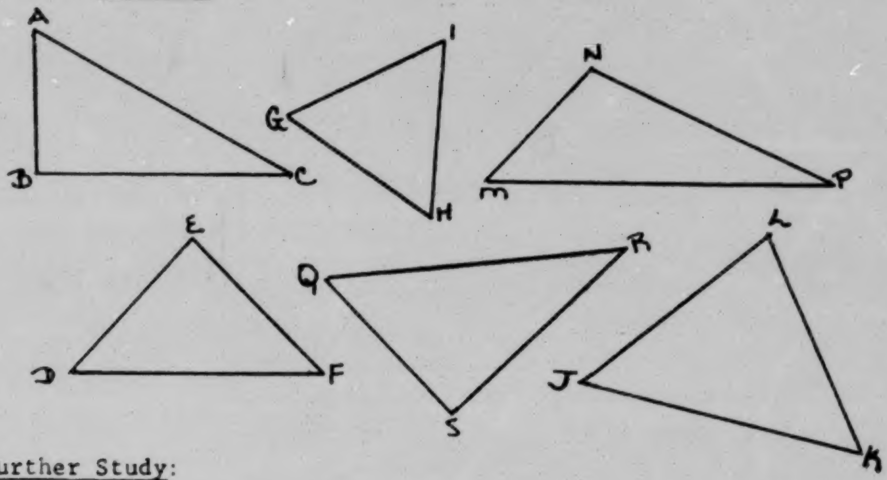
Materials Needed:

paper
pencil
ruler
protractor
compass

Directions: Please follow instructions. After you have completed your work, give your completed design to your instructional leader.

Step 1 Make triangles that are identical (congruent) to the triangles below. Use the geometry set. Cut out each triangle you made to see whether it fits exactly over the triangle you copied.

Step 2 What has to be true of two triangles that are congruent?
Examples



Further Study:

1. What does congruence mean?
2. How did you make each congruent triangle?
3. How did you know the triangles were congruent?
4. Make two congruent triangles.
5. Name geometric models that are duplicated many times and some of the ways they are used (cylinder, tin can, water glass, and so on).
6. Write a definition of congruence.
7. Trace around pairs of congruent flat shapes.
8. Make three different shapes. Make three shapes congruent to them.

Activity 41 - Finish the Design

Mathematics Involved: Investigates points, line segments, enclosed regions, shapes and line symmetry.

Materials Needed:

paper	rubber bands
pencil	pegboard or geoboard
protractor	

Directions: Please follow instructions. After you have completed your work, give your completed design to your instructional leader.

Step 1 Use the pegboard, pegs and rubber bands to make the half design shown below. Complete the design by making the other half a mirror image of this one.

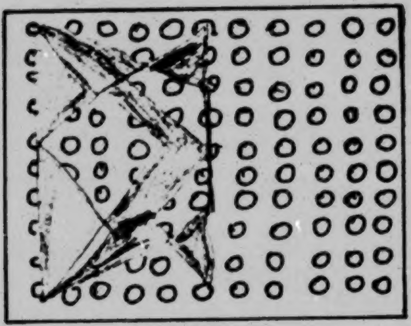
Step 2 Measure and name six different angles.

Step 3 Name four different regions.

Step 4 How does mirror image compare with the real image?

Step 5 Fill in some of the regions with colored paper to make a design.

Step 6 Duplicate your design on paper.
Example



Further Study:

1. How do you measure angles?
2. Illustrate acute, obtuse, and right angles on the pegboard.
3. Show me what is meant by a region.
4. Name and define three different shapes.
5. Define symmetry, region, line, segment, angles and triangle.
6. Fold a piece of art paper. Put paint on the crease. Press. Open the paper. Finish the painting so that the design is symmetrical.
7. Use tape and graph paper to show the number from 1 to 10, and from 10 to 1. Draw the line of symmetry.
8. Using cardboard boxes, make a three-dimensional pattern in which one side is symmetrical to the other.
9. Using glue, heavy paper, and various materials from the home (spaghetti, cereal, and so on) make a symmetrical picture.
10. List objects that are symmetrical in design.
11. Use a photograph and a mirror to show how a person would look if his right (or left) half were a mirror image of his left (or right) half.
12. List the properties of some geometric objects (line segment, angle, square and so on).

ACTIVITY 42 - Shape Intersections

Mathematics Involved: Diagnostic check dealing with the understanding of triangles, quadrilaterals, and points of intersection.

Materials Needed:

paper	geoboard or pegboard
pen	rubber bands

Directions:

Follow these steps carefully. When you have finished your assignment give it to your instructional leader.

Use the rubber bands and pegs on the pegboard to make each of the following:

(1) Two triangles with 0 points of intersection.

(2) Two quadrilaterals with 0 points of intersection.

(3) Two triangles with only 1 point of intersection.

(4) Two quadrilaterals with only 1 point of intersection.

(5) Two triangles with only 2 points of intersection.

(6) Two quadrilaterals with only 2 points of intersection.

(7) Two triangles with only 3 points of intersection.

(8) Two quadrilaterals with only 3 points of intersection.

DO THIS» Can you make two triangles with only 4 points of intersection? with only 5 points of intersection? with only 6 points of intersection?

NOW THIS» Can you make two quadrilaterals with only 3 points of intersection? with only 5 points of intersection? only 6 points of intersection? Draw your answers on your work paper.

Pick - A - Project or Answer A Question

1. Define triangle, quadrilateral, and point of intersection.
2. How do a quadrilateral, a rectangle, and a square differ.
3. Make a chart with information about triangles, quadrilaterals, and points of intersection.
4. Put pegs on the pegboard and use colored string, thread, or yarn to make an interesting pattern.

5. Find magazine pictures showing triangles, quadrilaterals and points of intersection.
6. Where are triangular regions used in building houses?
7. Make a picture with toothpicks and glue. Color triangles one color and quadrilaterals a second color, and indicate point of intersection.
8. How many points of intersection can you show with two straight soda straws? with four? with ten?
9. Use straight soda straws and string to make three-dimensional shapes.
10. Sew an interesting geometric pattern on cardboard with a darning needle and yarn.

ACTIVITY 43 - Seeing Patterns In Different Ways

Mathematics Involved: Investigates interiors of regions and intersections of regions and permutations and combinations.

Materials Needed:

Paper	Set of Geometry Flat Shapes
pencil	Color pen

Directions:

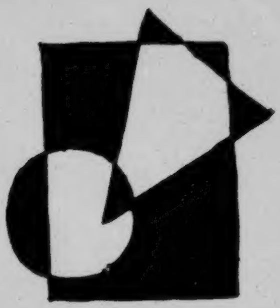
Follow these steps carefully. When you finished your assignment give it to your instructional leader.

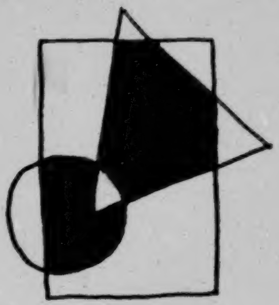
Step 1 Use a circle, a triangle, and a rectangle to draw a pattern in which the overlap.

Step 2 Repeat the pattern ten times.

Step 3 Try to shade each pattern in a different way, using only one color.

Step 4 How many different ways do you think you could shade your pattern?





Further Study

1. Name some of the different shapes in your patterns.
2. Show me a point of intersections, an arc, a line segment, a quadrilateral, a triangel, a pentagon, and a vertex.
3. Describe your pattern.
4. Find patterns in your classroom and in your home.
5. Make a complex pattern. Now find and color all congruent shapes in the pattern.
6. Use the squares and number card to make interesting patterns on your desk.

7. Outline the faces of some geometric models to make an interesting pattern.

8. Draw the side of a tall building five times. Color the windows in different pattern each time.

9. Draw five different pattern you see on your friends clothes.

ACTIVITY 44 - Radius, and Circumference

Mathematics Involved: Discovering the relations between radius, diameter, and circumference.

Materials Needed:

paper	string
pencil	rules
compass	scissors

Directions:

Please complete all activities. At the end of this assignment give your work to your instructional leader.

Step 1 Use a compass to draw four circles an stiff cardboard. The circles should have a radii of 1 inch, 2 inches, 3 inches, and four inches.

Step 2 Measure the diameter of each circle.

Step 3 Cut out each circle.

Step 4 Measure the circumference of each circle by wrapping it with string or rolling it along a ruler.

Step 5 Copy and complete this chart.

Radius	Diameter	Circumference
1"	2"	a little more than 6"
2"		
3"		
4"		

Step 6 Can you discover any relationships between the numbers on the chart?

Further Study

1. Explain radius, diameter, and circumference.
2. What would the diameter (or circumference) be if the radius were 5 inches (or 6 inches, and so on)?
3. Make a graph of the part of your chart relating diameter and circumference.

4. Draw a circle and label the center, a radius, a diameter, a chord, and the circle itself.

5. Measure the radius, diameter, and circumference of five circular objects in your room.

6. Write a paragraph on the value of the wheel to man.

7. Find the radius, diameter, and circumference of phonograph records (33 1/3, 45, and 78 rpm)

8. Discover ways of measuring the diameters of various spheres.

ACTIVITY 45 - Counting Faces

Mathematics Involved: Investigating shape and form of geometric models, also stressing the knowledge of face and the concept of perspection.

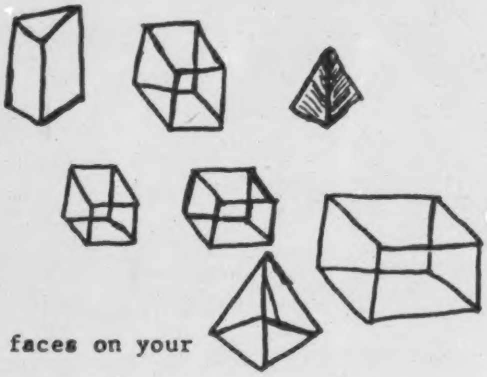
Materials Needed:

paper geometric solids

pencil

Directions:

Please directions carefully and complete all work. When you are finished, give assignments to your instructional leader.



Step 1 Select the solids similar to the ones shown.

Step 2 Count the number of flat surfaces on each shape.

Each flat surface is called a face.

Step 3 Draw each shape and write the number of faces on your drawing.

Further Study

1. Which model has the most faces? Which has the fewest faces.
2. Count the number of faces on several objects in the room. Draw the objects.
3. Make a scrapbook in which you use pictures of objects; indicate the number of faces on each.
4. Sort objects according to the number of faces they have.
5. Count the faces on various buildings. What building that you know of has the most faces.
6. Count the faces on various household items (cereal boxes, mailbox, cabinets, etc.)
7. List objects that have four, five, six, seve, and eight faces. Can you think of one with three faces?

ACTIVITY 46 - Edges and Corners

Mathematics Involved: Studying the relationship between objects and their two-dimensional counterparts. The concepts stressed are side, vertex, and diagonal.

Materials Needed:

paper (unlined)   flat geometric shapes

paper

Directions:

Please follow all directions very carefully. When you have finished your work, give your paper to your instructional leader.

Step 1 Take any ten of the flat shapes from the kit. Draw the outline of each shape on your work paper.

Step 2 Count the number of edges on each side. Write the number on each outline.

Step 3 Draw lines in each of your figures that go from one corner (vertex) to another corner that is not part of the same edge. These lines are called diagonals. Write the number of diagnoals on each outline.

Step 4 Add the number of diagonals to the number of edges and write that number on each outline.

Step 5 What numbers have you written on your outline? Which of the number from 0 to 10 have you not written?

Further Study

1. How many figures with four edges did you draw? How many with three edges?
2. Draw a figures with five edges.
3. Draw the diagonals in your figure with five edges. How many vertices does it have? What is the total number of edges and diagonals?
4. Outline five thing in the classroom and count the edges.
5. Build or draw houses, using only figures with three or four edges.
6. Make an abstract drawing. Use only straight line and count the edges on the shape.
7. Measure around object. Use rods, disks, and so on.
8. Draw pictures of buildings. Make each deges a different color.
9. Make a sculpture. Use cardboard, tape, or string. Count the total number of edges.

ACTIVITY 47 - Pictures and Sides

Mathematics Involved: Identification of line segments, counting, matching sides with numerals, manipulation of flat shapes, and construction of more complex flat shapes.

Materials Needed:

paper	flat geometric shapes
pencil	

Directions:

Please follow your directions carefully. As soon as you have completed your assignment, give your paper to your instructional leader.

Step 1 Use the flat shapes to make three different figures.

Step 2 Draw each figure. Count the number of sides on each figure, and write the number on your drawing.

Further Study

1. Run your finger around the perimeter of the shape.
2. How many flat shapes did you use for each picture.
3. Describe a shape in such a way that a friend will know to draw in.
4. Make a picture of the building you live in and the area around it with the flat shapes.
5. Find flat shapes in the classroom. Draw and label them.
6. Draw complex shapes and try to name them.
7. Find out waht polygons are and tell the other children.
8. Trace the flat shapes. Cut them out and use them to make pictures of animals.
9. Collect pictures of flat shapes from magazines.

ACTIVITY 48 - Counting on Shapes

Mathematics Involved: Investigating geometirc solids, emphasis being placed on corner, face and edge.

Materials Needed:

paper

pencil

Directions:

Please follow all direction very carefully. When you have finished your work, give your paper to your instructional leader.

Step 1 Take the geometric models show at the left from the kit.

Step 2 Make a chart like the one in the example.

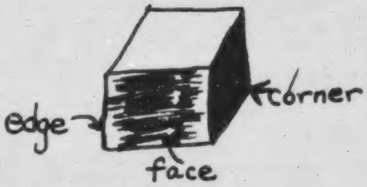
Step 3 Count the number of corners on each shape.

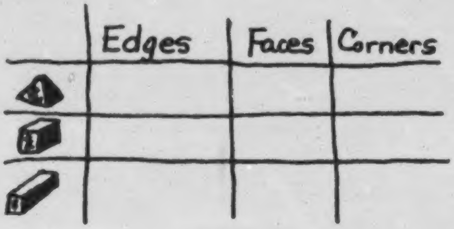
Step 4 Count the number of faces on each shape.

Step 5 Count the number of edges on each shape.

Step 6 Write your answers on your chart.

Example:





	Edges	Faces	Corners

Further Study:

1. Make geometric models from straws and pipe cleaners.
2. Count the number of corners, faces, and edges on objects in the classroom.
3. Build three-dimensional models out of cardboard boxes and discuss them.
4. Build a mobile of models made from cardboard boxes.
5. How many corners, faces and edges are there on the door of the classroom or on a desk or a box in the classroom?

Activity 48 - Counting On Shapes

6. Make a booklet of descriptions of any geometric models you can find.

7. Cut a part cardboard boxes and reassemble the in new interesting ways.

8. Make a cardboard box-city. Label the corners, vertices, and faces of each building.

ACTIVITY 49 - Points of Intersection

Mathematics Involved: Studying points of intersection.

Materials Needed:

paper	pegboard
pencil	rubber bands

Direction:

Please follow all directions very carefully. When you have finished your work, give you paper to your instructional leader.

Step 1 Use 11 pegs and 3 rubber bands to make an interesting pattern on the pegboard. Make as many point of intersection as you can.

Step 2 There are 48 points of intersection on the pattern in the example. Can you see them?

Step 3 Can you make a pattern with more?

Further Study

1. Give some examples of points of intersection.
2. What shapes can you find in your pegboard pattern?
3. Draw the outlines of the largest and smallest shapes in your pattern.
4. On a world map, find point of intersection (for example, where lines of longitude cross of latitude).
5. Draw your pattern and label each point of intersection with a letter of the alphabet.
6. Draw and color some of the shapes you have made on your pegboard. Color each different shape a different color.
7. What do parallel, intersecting, and skew mean?
8. How many line segments are there in your pattern?
9. Count the number of triangles in your pattern. Count the number of of four-sided figures (five-sided figures, six-sided figures) in your pattern.
10. How many angles are there in your pattern?

ACTIVITY 50 - Shape Counting

Mathematics Involved: Studying shapes with emphasis on side, corner, and angle.

Materials Needed:

paper	flat shapes
pencil	

Directions:

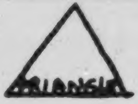
Please follow all directions very carefully. When you have finished your work, give your paper to your instructional leader.

Step 1 Draw the outlines of ten of flat shapes on your work paper. Count the number of corners (vertices) on each shape.

Step 2 Count the number of angles in each shape.

Step 3 Write the names of the shapes on your figures.

Step 4 Write your answers on your work paper.

Shape	Number of sides	Number of Angles	Number of Corners (Vertices)
	3	3	3

Further Study

1. Make your own set of flat geometric shapes. On each write the number of sides, angles, and edges.
2. Make different flat shapes by fitting the flat shapes together. For example make a rectangle from triangles and a square from rectangles.
3. Draw a interesting picture, using the flat shapes from the kit or some shapes you made.
4. Find objects that are triangular, rectangular, square or circular.
5. Make a mobile of flat shapes cut from cardboard.
6. Use graph paper to find the number of squares covered by the flat shapes (including any you have made).

7. Find the perimeter of each flat shape.

8. Cut apart a cardboard box. Reassemble it in a new and interesting way.

ACTIVITY 51 - Finding The Shape

Mathematics Involved: Studying the properties of three dimensional geometric figures.

Materials Needed:

paper	set of geometric solids
pencil	

Directions:

Please follow all direction very carefully. When you have finished your work, give your paper to your instructional leader.

Step 1 Find the geometric models that have --

1. only two flat surfaces (Faces are surfaces, but surfaces can also be curved.)
2. only twelve edges
3. only one curved and one flat surface
4. only five corners
5. no edges
6. the least amount of surface touching the table
7. the greatest amount of touching the table

Step 2 Write the name of each model on your work paper.

Step 3 Can you think of other ways to describe other models?

Further Study

1. What was the easiest (or hardest) shape for you to find?
2. Select a geometric model and ask, "How would you describe this model?" Stress the use of the terms surface, edges, and corners.
3. Name things shaped like each model.
4. Make a graph showing the number of surfaces, edges, and corners of each model.
5. List places where object shaped like each geometric model are used.
6. Sort the shapes according to hwo they roll.
7. Sort the geometric models according to similar features.
8. Draw each geometric model.
9. Make each shape from cardboard.
10. Find pictures of object other than the geometric models and name each.

ACTIVITY 52 - Triangle

Mathematics Involved: Constructing triangles and other flat shapes.

Materials Needed:

paper protractor compass

pencil ruler

Directions:

Please follow all directions very carefully. When you have finished your work, give your paper to your instructional leader.

Step 1 Use a ruler and pencil to draw five different triangles.

Step 2 Measure the three angles of each triangle with the protractor.

Step 3 Add the measure of the three angles of each triangle together.

Step 4 Is there a pattern?

Step 5 Do the same thing with figures with four sides, figures with five sides, and figures with six sides.

Step 6 Is there a pattern?

Further Study

1. What did you discover about the sum of the measures of the angle of a triangle?
2. What is a protractor? How do you use it?
3. What is the unit of measurement on the protractor.
4. Draw a straight line and mark a point on it. Measure the angle at the center.
5. Make a triangle. Draw another exactly like it.
6. Draw a circle. Draw two diameters. Measure the four angles and add them.
7. Make a cube out of cardboard; then open it up and measure all the angles.
8. Draw a rectangle. Measure the four angles and add them.
9. Tell what a protractor, an angle, and a degree are.
10. Cut the three corner portions off a paper triangle. Can you paste them together to form a straight line?
11. Draw and name the different kinds of triangles.

ACTIVITY 53 - Drawing Faces

Mathematics Involved: Making geometric models.

Materials Needed:

paper	scissors
construction paper	geometric solids*
pencil	tape

* Select shapes with all face (no cones, spheres, etc.)

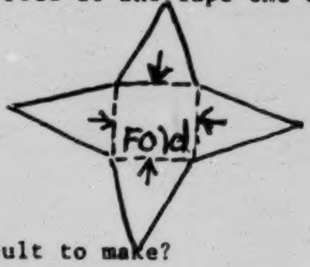
Directions:

Please follow your directions carefully. As soon as you have completed your assignment, give your models to your instructional leader.

Step 1 On your work paper or a piece of cardboard, outline the faces of the models you have selected. The example shows you how.

Step 2 Cut out your outline. Fold it and tape the edges together.

Example:



Further Study

1. Which model was most difficult to make?
2. Which model had the greatest perimeter when flattened?
3. Which model has the greatest surface area.
4. Rank the perimeters of the geometric models when flattened from greatest to least.
5. List objects that are similar in shape to the geometric models (a box, a roof, etc.)
6. Using the geometric models you made, make a mobile.
7. Make a large mural illustrating shape.
8. Rank the areas of the geometric models form greatest to least.

ACTIVITY 54 - Circumference

Mathematics Involved: Determining the relationship of the diameter of a circle to the circumference.

Materials Needed:

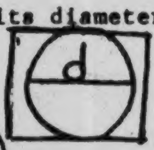
paper
pencil
large coin
string

Directions:

Please read all information carefully. Answer all questions. When you have finished your assignment, give it to your instructional leader.

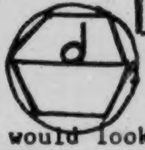
Read How is the circumference of a circle related to its diameter?

We found that the circumference is less than 4 times the diameter



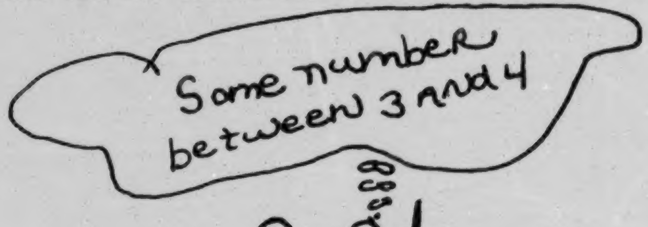
$C < 4d$

and that the circumference is greater than 3 times the diameter

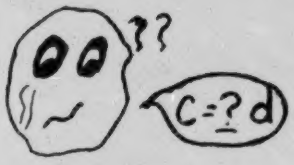


$C > 3d$

So, the formula for the circumference of a circle would look like this:

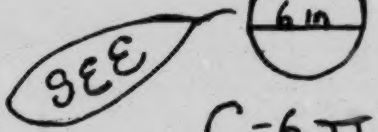


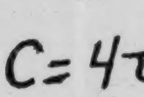
$C = \bigcirc d$



The number we need to complete the formula is called π (pi). It is given this name because it can not be written with a "regular" numeral.

$C = \pi d$





$C = 6\pi$ in

$C = 4\pi$ ft

Now try these problems.

1. Carefully measure the diameter of a large coin (or other round object)

____

____

Activity 54 continued

2. Measure its circumference by using a piece of string. ______________
____.

3. Divide the circumference by the diameter. Your answer should be near π .
____

____

References

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A Brief Course in Mathematics
For Junior High School Teachers
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Leland Stanford Junior University

Games for Learning Mathematics
Danovan A. Johnson
J. Weston Walch, Publisher, 1973

Geoboards & Matian Geometry for Elementary Teachers
John J. Del Grande
Scott, Foresman and Company, 1972

FRACTION FUN

by

Janet M. Ransom
General Math Teacher
Thorpe Junior High School

Unit: Rational Numbers

Learning Objectives

1. The student will recognize a fraction by sight.

2. The student will understand the meaning of fraction and fractional units.

3. The student will show his understanding of fractional units using the numbers 4, 5, 7, 8, 2, 9, 15 and 21 to make a list of fractional units. Then the student will write in words each fractional unit.

4. The student will distinguish between the three types of fractions which follow:
   a. those that name values < 1
   b. those that name 1
   c. those that name values > 1

5. The student will understand the meaning of proper, improper and mixed fraction.

6. The student will demonstrate his understanding of proper, improper and mixed fraction by making a chart with a column.of each. There will be at least ten items in each column.

7. The student will show equivalent fractions such as 2/4 = 1/2, using physical objects or pictures.

8. The student will use the property of 1, the identity element of multiplication, to rename fractions in simplest form. (Reduce fractions to lowest terms) Example: $6/8 = \frac{3 \cdot 2}{4 \cdot 2} = 3/4 \times 1 = 3/4$

9. The student will use the multiplication identity to rename fractions in higher terms. Example: $7/8 \times 3/3 = 21/24$

10. The student will add and subtract like fractions using horizontal and/or vertical algorithms and rename the answer in simplest form.

11. The student will identify prime and composite numbers 1-100.

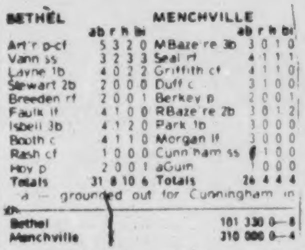
12. The students will add and/or subtract unlike fractions whose given denominators are:
    a. Prime numbers, whose LCD is the product of the denominators (1/3 + 1/2).
    b. Prime and composite numbers, neither of which is a multiple of the other (1/8 + 1/3).
    c. Prime and composite numbers where one is a multiple of the other (1/3 + 5/12 + 1/5).
    d. Composite numbers one of which is a multiple of the other (1/4 + 5/12).
    e. Composite numbers none of which is a multiple of the other (1/4 + 2/9).
    f. Composite numbers, containing a common factor , whose LCD can be found by using factors (3/4 + 1/6 + 1/9).

The books and materials listed on the following pages are keyed to the concepts and objectives which will be emphasized in this unit.

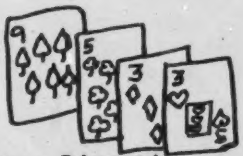
Materials	Objectives											
	1	2	3	4	5	6	7	8	9	10	11	12
1. Graph paper and plain paper.		X	X									
2. Construction paper.	X	X				X	X					
3. Newspaper Clippings.	X		X									
4. Magazine Articles.	X		X									
5. Counters and Hooks.			X				X					
6. Cuisenaire Rods and Clay.												X
7. Fraction wheel - (Teacher-made)	X	X	X	X	X	X	X	X	X	X	X	X
8. Prime Drag-This is a game that provides practice with the skill of learning prime and composite numbers.								X	X	X		X
9. Beadboard and Peg boards.	X	X	X	X	X	X	X	X	X	X	X	
10. Monopoly	X	X	X	X	X	X	X	X	X	X	X	X
11. Action Fraction-A game used to perfect skills in equivalent fractions, common denominators and like fractions.	X	X	X	X	X	X			X	X	X	X
12. Compass, ruler, and scissors.	X	X	X			X	X					
13. Flannel board and fractional parts.	X	X	X	X	X	X	X	X	X	X	X	X
14. Math Activity Worksheet Masters. These are prepared activities using fractions.		X			X	X	X	X	X	X	X	X
15. Puzzles (Basic Math Workbook).				X			X			X		X
16. Math Application Kit-Science Research Associates 1968. This kit contains 270 activity cards that require students to collect and use data to arrive at their own conclusions.	X	X	X	X	X	X	X	X	X	X	X	X
17. Math Tapes Program-Science Research Associates 1968. This is a 60 tape program divided into eight units to help introduce, reinforce, and provide practice in math. The areas are troubleshooting, mathematical skills, concepts and operations of algebra, ratio, percent numerational systems, geometry and problem solving.	X	X	X	X	X	X	X	X	X	X	X	X
18. Arithmetic We Need-This book uses math as a tool that influences thought and activity.	X	X	X	X	X	X	X	X	X	X	X	X

Materials	Objectives											
	1	2	3	4	5	6	7	8	9	10	11	12
19. Mathematics for Elementary School Teachers, by G. Cuthbert, Webber	X	X	X	X	X	X	X	X	X	X	X	X
20. Mathematics-Structure and Skills, SRA Series, 1968. (A basic textbook designed for slow learners)	X	X	X	X	X	X	X	X	X	X	X	X
21. Weighing scales and coins.	X	X	X	X								
22. Dictionary.	X	X			X	X			X			
23. Filmstrips by (SVE). Provide enrichment exercises for all levels of learners.	X	X								X		X
24. Unifix blocks.							X					

Student and teacher-directed activities are keyed to the materials and the concepts.

Activities	Mat'ls	Objectives											
		1	2	3	4	5	6	7	8	9	10	11	12
1. All Students-Bring in and display pictures and articles that make use of rationals in an important way.	3, 4	X	X										
2. All Students-Listen to a speech by a parent or local personality on the importance of rationals in every-day life.													
3. Station A  BETHEL ab r h bi / MENCHVILLE ab r h bi Art'r p-cf 5 3 2 0 MBaze're 3b 3 0 1 0 Vann ss 3 2 3 3 Seal rf 4 1 1 1 Layne 1b 4 0 2 2 Griffith cf 4 1 1 0 Stewart 2b 2 0 0 0 Duff c 3 1 0 0 Breeden rf 2 0 0 1 Berkey p 2 0 0 1 Faulk lf 4 1 0 0 RBaze're 2b 3 0 1 2 Isbell 3b 4 1 2 0 Park 1b 3 0 0 0 Booth c 4 1 1 0 Morgan lf 3 0 0 0 Rash cf 1 0 0 0 Cunn'ham ss [illegible] 1 0 0 Hoy p 2 0 0 1 aGuin 1 0 0 0 Totals 31 8 10 6 Totals 26 4 4 4 a — grounded out for Cunningham in Bethel 101 330 0—8 Menchville 310 000 0—4 Making Rationals a. Look at the article at the left. b. You are to make fractions letting the ab column be the denominators and the r column be the numerators. Example: The fractional unit for the first person listed on the Bethel team would be 3/5 = r/ab.	2, 12 3, 4	X	X	X	X								
4. Station B-Dividing a set of objects to show 1/2, 1/4, 1/5, 1/6, 1/8 and 1/10. a. Using a flannel board show a friend or a partner that you can divide a set of identical flannel objects into the above equal groups. (1/2, 1/4, 1/5, 1/6, 1/8, & 1/10). b. Now use a sheet of paper and write the name for each of the following (1/2, 1/4, 1/5, 1/6, 1/8, & 1/10).	13	X	X										
5. Station C-Definition Center-Get a dictionary and look up the following words: fractions, rationals, equivalent fractions, numerator and denominator. Be sure to get the math definition provided for you in the dictionary.	22			X	X	X	X	X	X	X			
6. Station D-Library Fun-Get a pass and go to the library to do some research on the uses and importance of Rationals in industry. Your teacher will give you some more specific directions. Do a written report on your findings.	22	X	X	X	X	X	X	X	X	X	X		
7. Station E-Silent Film Fun-Get the filmstrip previewer and preview the filmstrip "Introduction to Rational Numbers" by SVE. Try working all of the problems at the end of the filmstrip.	23	X	X	X	X	X							
8. Station F-Get two sheets of plain paper, a compass and a box of crayons. Draw two circles on both sides of each sheet of paper. Divide the circles into 2, 3, 4, 5, 6, 7, 8 & 10 sections respectively. Now start with the first circle and color one of the sections, the next circle color two sections and so on until all circles have been colored. Make a list showing	1,2, 12	X	X	X				X					

Activities	Mat'ls	Objectives											
		1	2	3	4	5	6	7	8	9	10	11	12
8 continued - what part of each circle you colored. Make a second list showing what part of each circle you did not color. Example: Colored — Not Colored 4 out of 5 = 4/5 — 1 out of 5 = 1/5	1,12 2			X	X			X		X			
9. Teacher-directed activity-Show and Tell Go over the process of writing equivalent rationals. Start with the simple and progress to the harder ones. Problems for a practice will be provided as a mimeographed sheet.		X						X	X	X			
10. a. Look at the Top 20 Chart to the bottom of this poster. b. You are asked to make fractions. c. Let the even numbered records be the numerator and the odd numbered records as the denominators. Example: $\frac{\text{Payback}}{\text{Looking For A Love}} = \frac{2}{3}$ d. Make as many different rationals as possible. e. Now go back and write the name of each rational in words. Example: 2/3 = two thirds **SOUL BROTHERS TOP 20** Title, Artist and Label ① **TSOP** .... MFSB (Philadelphia International) ② **PAYBACK** .... James Brown (Polydor) ③ **LOOKING FOR A LOVE** .... Bobby Womack (United Artists) ④ **KEEP IT IN THE FAMILY** .... Leon Haywood (20th Century) ⑤ **DANCING MACHINE** .... Jackson Five (Motown) ⑥ **BEST THING THAT EVER HAPPENED TO ME** Gladys Knight & The Pips (Buddah) ⑦ **OUTSIDE WOMAN** .... Bloodstone (London) ⑧ **MIGHTY LOVE** .... The Spinners (Atlantic) ⑨ **THANKS FOR SAVING MY LIFE** .... Billy Paul (Philadelphia International) ⑩ **IT'S BEEN A LONG TIME** .... New Birth (RCA) ⑪ **BOOGIE DOWN** .... Eddie Kendricks (Tamla) ⑫ **MY MISTAKE** .... Diana Ross and Marvin Gaye (Motown) ⑬ **JUST DON'T WANNA BE LONELY** .... Main Ingredient (RCA) ⑭ **I LIKE TO LIVE THE LOVE** .... B. B. King (ABC) ⑮ **TRYING TO HOLD ON** .... Lamont Dozier (ABC/Dunhill) ⑯ **HEAVENLY** .... The Temptations (Gordy) ⑰ **HONEY PLEASE** .... Barry White (20th Century) ⑱ **YOU MAKE ME FEEL BRAND NEW** .... Stylistics (Avco) ⑲ **I WISH IT WAS ME** .... Tyrone Davis (Dakar) ⑳ **SEXY MAMA** .... The Moments (Stang)	3,4	X	X					X			X		

		Objectives											
Activities	Mat'ls	1	2	3	4	5	6	7	8	9	10	11	12
11. Station H - The recipe for Strawberry Charlotte makes 10 servings. How much of each ingredient would you need to make only 5 servings? 2 servings? Example: If it takes 2 cups of cream to make 10 servings, it would take ½ as much or 1 cup of cream to make 5 servings. Makes 10 servings. Each serving: 296 cal.; 3 gms. P.; 19 gms. F.; 30.7 gms. C. Source of vitamin C. 2 envelopes unflavored gelatin ½ cup water 1 quart firm, ripe strawberries, washed and hulled 1 cup sugar 2 teaspoons lemon juice 1 teaspoon vanilla 4 drops red food coloring 1 package (3 ounces) ladyfingers 2 cups (1 pint) heavy cream	2,3,4	X	X	X				X					
12. Station J - Look completely through the packet of fabric material and make fractions using the total number of pieces as the denominator and each of the following as the numerator: a. all solid color pieces b. all pieces with white in it c. all flowered pieces d. all pieces with green in it NOTE TO THE TEACHER: It will be necessary for you to provide the students with scraps of fabric material in order for them to complete this activity.	2	X	X	X				X					
13.  **Card Fun - Directions - Look at all the cards above. Now make a list showing the following: a. The part of the cards that are red b. The part of the cards that are black c. The part of the cards that are spades, hearts, clubs, & diamonds d. The part of the cards that are green. NOTE TO THE TEACHER: You will have to provide students with a variety of playing cards in order for them to complete this activity.**	2	X	X	X									
14. Teacher-directed activity - With a small group of students go over how to add fractions with a common denominator. Practice activities for the students should be provided.	14,15	X	X	X					X	X	X	X	X

Activities	Mat'ls	Objectives											
		1	2	3	4	5	6	7	8	9	10	11	12
15. Station K - Adding Like Fractions Using Unifix Blocks **Activity** 1. Get some unifix blocks from the teacher. 2. Hook together four blocks and call the train "1". 3. Take blocks and find ½ of the train and hook those blocks together. 4. Add 1/2 + 3/2 by hooking together two blocks to represent each half and write: 5. Make other trains to represent "1", then find the sum of thirds, fourths, sixths and eighths. Follow the example above.	24	X	X	X				X	X	X	X	X	X
16. Station M - Comparing Fractions Using Cla Instructions: 1. Get some clay from the teacher 2. Make a ball of clay 3. Make another ball of clay that is ½ the size of the first ball 4. Make a third ball of clay that is 1/3 the size of the first ball 5. Make a fourth ball that is one fourth the size of the first ball 6. Weigh to find which is the heavier and record all results a. "1" or "1/2" b. "1/2" or "1/3" c. "1/4" or "1/2" d. "1/4" or "1/3"	6	X	X	X				X					
17. Teacher-directed activity-Have a discussion on how to change an improper fraction to a mixed fraction. Exercises should be provided for the students in order to help them develop this skill.	14	X	X	X	X			X	X	X			
18. Go to Station N with a friend and play Prime Drag. This activity is a way of reviewing prime numbers.	3	X	X	X				X					
19. Fraction Fun - Using Money (Coins) a. Go to Station P and get the coins in slot A. b. Divide the coins into 1/2's, 1/4's, 1/8's and 1/10's. c. As you divide the coins into each fractional section, make a chart showing the total amount and the amount in each pile after separating the coins. d. Do the same for slots B, C, and D.	21	X	X	X		X							

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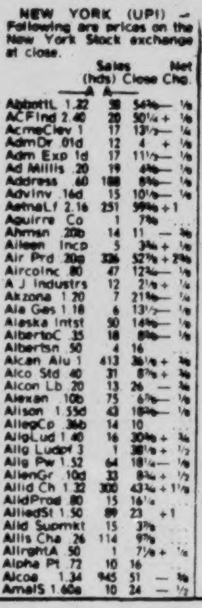
Activities	Mat'ls	Objectives											
		1	2	3	4	5	6	7	8	9	10	11	12
20. Teacher-directed activity - Show students how to add fractions with different denominators. The student will be provided with ditto materials for drill and practice in this skill.	14	X	X	X									X
21. Teacher-directed activity - Discuss how to subtract fractions with different denominators. The student will be provided with ditto materials for drill and practice in this skill.	14	X	X	X									X
22. Look at the article at the bottom of this activity sheet. a. Pick out five different fractions b. Then arrange them in order from the smallest to the largest c. Pick out five more and do the same thing.  NEW YORK (UPI) — Following are prices on the New York Stock exchange at close.	2,3,4,12	X	X	X	X								
23. Station S 9 3 6 2 5 Choose a number above that you want to be the denominator and use the other four numbers as numerators. Make each fraction then add them two at a time. Example: If my denominator is 5 than here are my fractions 9/5, 3/5, 6/5, and 2/5. My addition problems would be: 9/5 + 3/5 = 12/5 9/5 + 6/5 = 15/5 9/5 + 2/5 = 11/5 NOW YOU TRY! 3/5 + 6/5 = 9/5 3/5 + 2/5 = 5/5 6/5 + 2/5 = 8/5	3,4,2	X	X	X								X	X

Activities	Mat'ls	Objectives											
		1	2	3	4	5	6	7	8	9	10	11	12
24. Station T 5 3 2 4 7 8 **Choose a number above that you want to be the denominator and use the other five numbers as numerators. Make each fraction then subtract them two at a time, using the fraction with the larger numerator first.** **Example: If seven is my denominator, then my fractions would be: 5/7, 3/7, 2/7, 4/7, 8/7** **Here are my subtraction problems:** **5/7 - 3/7 = 2/7** **5/7 - 2/7 = 3/7** **5/7 - 4/7 = 1/7 NOW YOU CHOOSE ONE!** **3/7 - 2/7 = 1/7** **4/7 - 2/7 = 2/7**	2,3, 4	X	X	X								X	X
25. Go to Station U and listen to the tape on Addition and Subtraction of Fractions. These fractions will have like denominators. Try to work the exercises provided on the tape.	17	X	X	X							X	X	X
26. Go to Station V and listen to the tape on Addition and Subtraction of Fractions. The fractions will have unlike denominators. Work the exercises given on the tape.	17	X	X	X							X	X	X
27. Go to Station W and work out the Scramble-gram of Words pertaining to all the operations on fractions and all related terms.	14	X	X	X		X	X						
28. Using magazine and newspaper make a chart of all the fractions you can find in 20 minutes. Then list the fractions under the proper heading: proper, improper, and mixed fraction.	2,3, 4												
29. Fraction Fun - Footsteps to School **a. Go to Station X and look at the model of Hampton.** **b. Find the route you take from your house to Thorpe and count the blocks.** **c. Suppose that one block represents ½ of an inch.** **d. Now take the blocks you found in b and find out how many inch blocks you live from Thorpe.** **e. Do the same thing for two of your close friends.**	Clay Model of Hpt.	X	X	X							X		X
30. Fraction Fun - Go to station Y and play Action Fraction. Four are assigned to this station.	11	X	X	X							X	X	

Activities	Mat'ls	Objectives											
		1	2	3	4	5	6	7	8	9	10	11	12
31. a. Go to Station Z and play Monopoly with the other three people assigned to this station. Each person is to keep a record of his winnings. b. Now you are to make a fraction with your amount as the numerator and the other amounts as the denominator. (Make 3 fractions) c. Now go back and write whether the three fractions you wrote are proper or improper fractions.	10		X			X	X						

The exercises within the following pages are designed to serve as practice activities for those mathematics skills developed within this unit.

LEAST COMMON MULTIPLE

Find the LCM for each set of numbers below:

1. 4, 3 =
2. 6, 8 =
3. 3, 15 =
4. 16, 40 =
5. 36, 90 =
6. 24, 32 =
7. 35, 42 =
8. 12, 20 =
9. 8, 12 =
10. 27, 36 =
11. 42, 56 =
12. 75, 30 =
13. 8, 12, 16 =
14. 4, 6, 8 =
15. 10, 5, 12 =
16. 14, 7, 2 =
17. 3, 12, 20 =
18. 20, 30, 35 =
19. 48, 64, 96 =
20. 24, 36, 48 =
21. 2, 4, 6, 8 =
22. 3, 5, 12, 15 =
23. 6, 8, 24, 30 =
24. 48, 64, 72, 96 =

MULTIPLICATION

Draw a picture that will represent the products of the fractions below:

2/3 x 5/7 = 10/21	1/2 x 5/6 =

MULTIPLYING RATIONAL NUMBERS

Multiply and simplify the fractions below:

1. 2/3 (5/8) = 2(5) (1/3)(1/8) = 10/24 = $\frac{2(5)}{2(12)}$ = 2/2(5/12) = 1(5/12) = 5/12

2. 3/5 (2/7) =

3. 3/4 (1/5) =

4. 1/4 (5/6) =

5. 1/8 (3/4) =

6. 7/8 (1/3) =

7. 3/5 (2/11) =

8. 2/5 (4/7) =

9. 2/9 (1/5) =

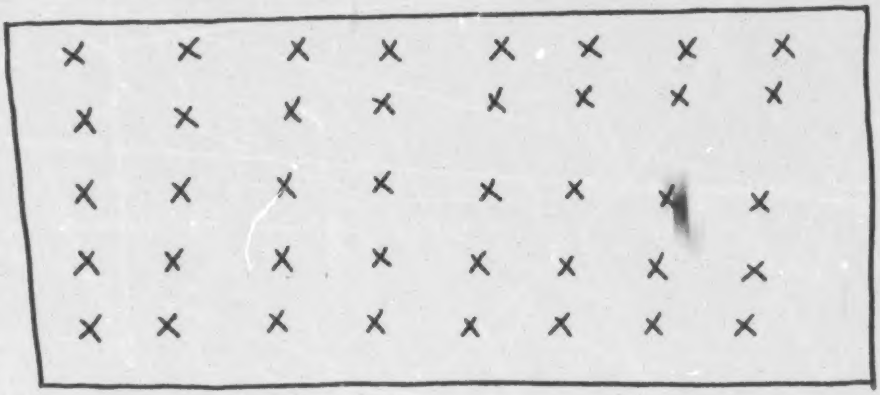
10. 3/5 (10/11) =

11. 3/4 (8/21) =

12. 7/8 (6/9) =

13. 2/3 (5/12) =

READINESS (X) (÷)



How many x's do you see? ________

How many groups of 2 x's are there? ________

How many groups of 4 x's are there? ________

1/2 of the x's is ________

1/8 of the x's is ________

1/4 of the x's is ________

1/5 of the x's is ________

GCF OF RATIONAL NUMBERS

Simplify each of the rational numbers by finding the GCF.

1. 15/18 = $\frac{3(5)}{3(6)}$ = 1(5/6) = 5/6
2. 18/24 =
3. 12/15 =
4. 40/70 =
5. 120/210 =
6. 64/66 =
7. 27/18 =
8. 45/15 =
9. 35/28 =
10. 48/60 =
11. 144/200 =
12. 315/378 =
13. 252/660 =
14. 660/1386 =
15. 1728/144 =
16. 1024/256 =
17. 504/720 =
18. 1260/3780 =

LEAST COMMON MULTIPLE

Find the LCM of the elements of each of the sets:

6, 8 =

4, 6 =

6, 9 =

10, 12 =

6, 6 =

12, 16 =

10, 14 =

5, 6 =

4, 5 =

7, 8 =

3, 7 =

7, 5 =

14, 16 =

10, 24 =

6, 7 =

2, 6, 7 =

3, 4, 5 =

10, 15, 30 =

4, 5, 6 =

8, 9, 12 =

PRIME FACTORIZATION

Using the method of repeated division find the prime factors for each problem below:

1. 84 = $2\overline{)\,84\,}$ = $2^2 \times 3 \times 7$
   $2\overline{)\,42\,}$
   $3\overline{)\,21\,}$
   7

2. 60 =

3. 105 =

4. 144 =

5. 91 =

6. 128 =

7. 120 =

8. 156 =

9. 130 =

10. 124 =

11. 160 =

12. 216 =

13. 256 =

14. 136 =

15. 512 =

16. 1728 =

ADDING RATIONAL NUMBERS

Use the distributive property in adding the fractions below:

7/8 + 5/12 = 3/3(7/8) + 2/2(5/12)
= 21/24 + 10/24
= (21 + 10) x (1/24)
= 31/24 = 1 7/24

1/6 + 5/8 =

4/15 + 5/6 =

3/8 + 9/20 =

3/10 + 3/4 =

3/8 + 5/6 =

7/9 + 5/6 =

7/10 + 3/4 =

USING EQUIVALENT FRACTIONS IN ADDITION AND SUBTRACTION

Find each sum or difference by using the methods of the examples.

1/2 + 1/4 = □/4 + 1/4 = □/4	5/6 - 2/3 = 5/6 - □/6 = □/6	3/4 - 1/8	2/3 + 1/9	7/10 - 2/5
3/5 + 2/15	9/10 - 1/2	1/6 + 1/2	1/4 + 5/12	5/8 - 1/2
3/4 - 3/16	1/6 + 2/3	1/6 + 5/12	2/3 - 8/15	11/20 - 3/10
5/24 - 1/12	3/5 + 7/20	9/16 - 3/8	7/18 + 1/6	1/7 + 5/21

Find the answer to each question.

1. Mrs. Green had 3/4 cup of sugar. She used 1/2 cup for a recipe. How much sugar did Mrs. Green have left?

2. The red ribbon is 3/4 of an inch wide, and the narrow blue ribbon is 1/8 of an inch wide. What is the combined width of the two ribbons?

3. Jim needed a bolt 3/8 of an inch in diameter. He found one 7/16 of an inch in diameter. Was this bolt too large or too small? How much?

ENRICHMENT

CROSS NUMBER PUZZLE

1	2	▨	3	4
5		▨	6	
▨	▨	7	▨	▨
8	9	▨	10	11
12		▨	13	

Note: Only one digit should be written in a space. If an answer is a fraction, the numerator is placed in the first space and the denominator in the next space. Fractions should be in lowest terms before their numerators and denominators are written in the puzzle.

Across

1. 1/6 + 1/6 =
3. 2/3 + 0/3 =
5. 1/2 + 1/8 =
6. 3/8 + 1/4 + 1/8 =
7. 2/3 + 11/12 + 5/12 =
8. 9/21 + 2/14 =
10. 1/28 + 1/14 + 1/28 =
12. 1/4 + 3/8 =
13. 2/3 + 2/9 =

Down

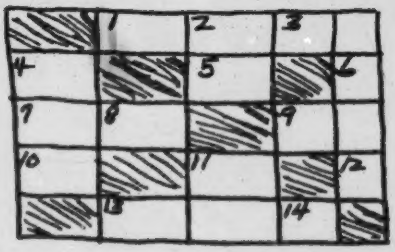
1. 1/6 + 1/30 =
2. 1/4 + 1/8 =
3. 1/4 + 5/12 =
4. 3/8 + 3/16 + 3/16 =
7. 3/4 + 2/5 + 1/10 + 3/4 =
8. 3/10 + 1/2 =
9. 1/3 + 5/12 + 1/8 =
10. 1/12 + 1/24 =
11. 4/9 + 2/6 =

Just for Fun

1. How can a man walk 3/4 mile due south, 3/4 mile due west and 3/4 mile due north and then be at the place from which he started?

2. If a girl can make a dress and a half in a day and a half, how many dresses can 8 girls make in a week?

CROSS-NUMBER PUZZLE



▨	1	2	3	
4	▨	5	▨	6
7	8	▨	9	
10	▨	11	▨	12
▨	13		14	▨

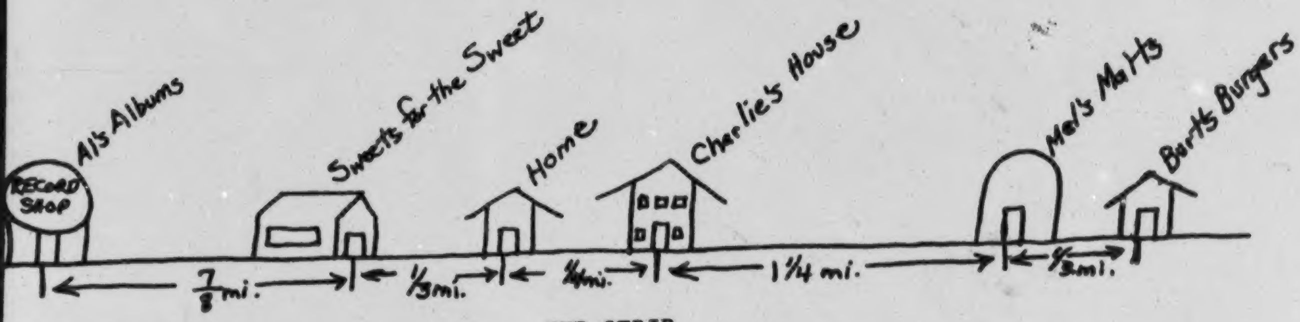
Across:

1. 1 equals what number over 360?
4. 1/2 equals how many 16ths?
5. 1/4 equals how many 16ths?
6. 10/10 equals what whole number?
7. What is the LCM of 6 and 8?
8. What is the GCF of 12 and 20?
9. 1/2 equals how many 20ths?
10. What is the GCF of 15 and 10?
11. What is the value of 24/12?
12. 0/13 equals what?
13. What is the value of 2 x 2 x 2 x 2 x 3 x 3?

Down:

1. 1/4 equals how many 12ths?
2. What is the value of 2 x 2 x 2 x 2 x 2 x 2?
3. What number may not be used as a denominator?
4. What is the value of 3 x 5 x 5 x 11?
5. 1/3 equals how many 12ths?
6. 25 over what is 1/4?
8. 2/3 equals how many 6ths?
9. What is the identity number of multiplication?
11. 2/3 equals 16 over what?
13. 15/30 equals what over 2?

ENRICHMENT


Al's Albums
RECORD SHOP
Sweets for the Sweet
Home
Charlie's House
Mel's Malts
Burt's Burgers
7/8 mi.
1/3 mi.
1/4 mi.
1 1/4 mi.
1/3 mi.

THE STRIP

1. How far is it from home to the record shop?
2. Which is farther from home - the sweet shop or school?
   How much farther?
3. How far is it from Burt's Burgers to school?
4. How much closer is it from school to home than it is from school to Mel's Malts?
5. How much greater is the distance from school to Mel's Malts than the distance from Mel's Malts to Burt's Burgers?
6. What is the distance from Burt's Burgers to Al's Albums?
7. Which is the farther from home - Al's Albums or Mel's Malts?
   How much farther?

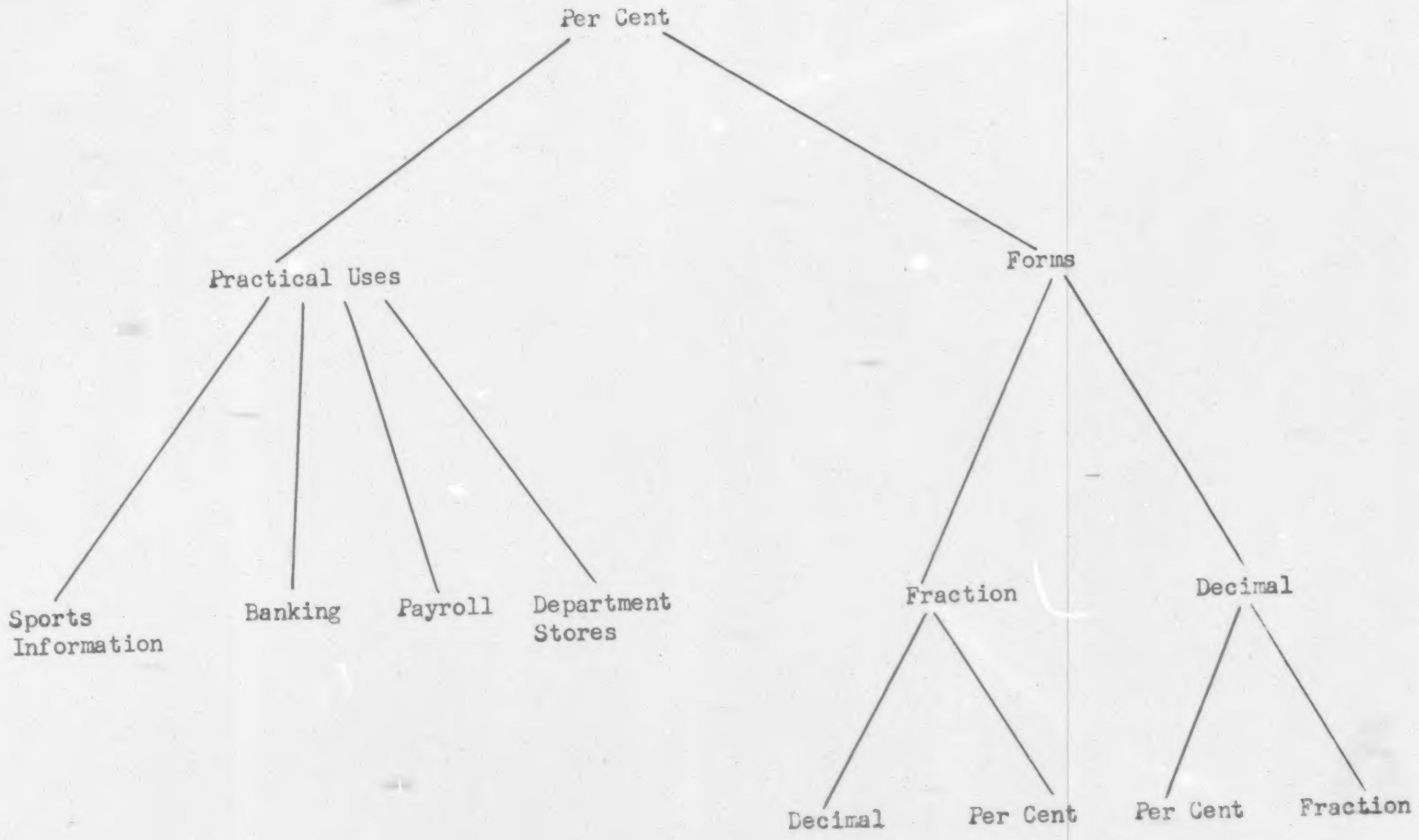
MINI UNIT ON PERCENTS

(A Three - Week Unit)

by

Janet M. Ransom
General Math Teacher
Thorpe Junior High School

STRUCTURED OVERVIEW


Per Cent
Practical Uses
Forms
Sports Information
Banking
Payroll
Department Stores
Fraction
Decimal
Decimal
Per Cent
Per Cent
Fraction

Objectives

1. The student will understand the meaning and many uses of percent.
2. The student will be able to identify percent in terms of hundredths.
3. The student will be able to use percents in comparing amounts.
4. The student will be able to read percents.
5. The student will be able to interpret percents.
6. The student will have the ability to:
    - a) Change a common fraction to a percent.
    - b) Change a decimal to an equivalent percent.
    - c) Change a percent to its equivalent decimal form.
    - d) Change a percent to its equivalent fractional form.
    - e) Change a common fraction to its equivalent decimal form.
    - f) Change a decimal to its equivalent fractional form.
7. The student will have the skill to use percents and percentages in daily problems.

The books and materials listed on the following page are keyed to the objectives.

Materials	Objectives						
	1	2	3	4	5	6	7
1. Graph paper and crayons	X	X	X	X	X		X
2. Math Application Kit (SRA) by Science Research Associates 1968. This kit contains 270 activity cards that require students to collect and use data in order to arrive at certain conclusions. The kit can help expand understandings and reinforce skills and motivate learning.	X	X	X	X	X	X	X
3. Math Tapes Program by Science Research Associates 1968. This is a 60 tape program divided into eight units to help introduce, reinforce, and provide practice in Math. The percent unit is recommended for use in this unit.	X	X	X	X	X	X	X
4. Compass, ruler, and scissors.	X	X	X	X	X		X
5. Filmstrips and filmstrip previewer. The filmstrips are by SVE and the names of the filmstrips are the following: a) Meaning and Application of Percent and Percentage b) Commission: Meaning and Application as It Relates to Percent c) Buying and Selling: Application of Percent d) Interest: Borrowing and Investing: Application of Percent e) The Many Uses of Percents	X	X	X	X	X	X	X
6. Dice and coins	X	X	X	X	X	X	
7. Fraction or equivalent wheel. The directions of how to make this are in the extra activites provided for students. (Activity 10).	X	X	X	X	X	X	X
8. Cassette player	X	X	X	X	X	X	X
9. Newspapers and magazines	X	X	X	X	X		X
10. Monopoly games (3)	X	X	X	X	X		
11. Dictionary	X						
12. Books from library. Library resource books are to be used to get information for projects.	X						
13. Construction paper	X	X	X	X	X		X
14. Circular graph - wall graph	X	X	X	X	X		X
15. Mathematics - Structure and Skills by Richard Denholm and Dale Blank. SRA Series 1968. This book is designed for the slow learned at the 7, 8, and 9th grade levels. This book contains a minimum of written instructions and presents ideas gradually. There is a great deal of illustrative art work, special problem sections, and an approach to measurement that emphasizes counting.	X	X	X	X	X	X	X

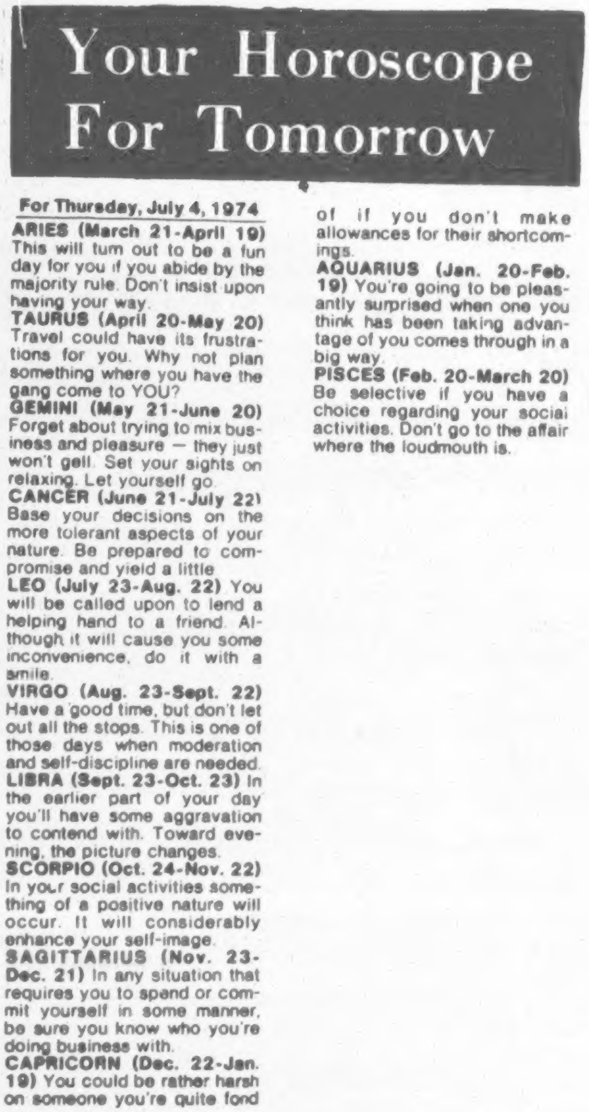
The teacher directed and student activities listed on the following pages are keyed to the objectives.

Activities	Materials	Objectives						
		1	2	3	4	5	6	7
1. Go to station A, get two magazines and three newspapers. Look through these magazines and newspapers and find articles for sale at a certain percent off. Cut out at least 10 articles and make an interesting poster display of your findings.	4,13	X	X	X	X			
2. Teacher directed activity - with a small groups of students discuss what percent is and where the students have seen it used. Also discuss why it is important (Allow students to give their original ideas).		X	X	X	X			X
3. Get the cassette player and listen to the tape entitled: Percent and Its Use in Business (Perform the activities in the tape.)	3,8	X	X	X	X	X	X	X
4. Look at the illustration. First, count all of the letters and use this number as the denominator. The make fraction numerators in the following ways: a) use all letters that are vowels as numerators. b) use all letters in heavy black print as numerators c) use all letters written in white as numerators d) use all letters that are consonants as numerators Now go back and change each on of the fractions you have made into a percent to the nearest hundredth.	4,13	X	X	X	X	X	X	X
5. Teacher directed-activity. With a small group of students go over how to change a fraction to a percent. (Use 100 as the denominator.) Example 3/4 · 25/25 = 75/100 = 75% Problems can be found at the end of this unit.	Practice materials located at end of unit.		X	X	X		X	
6. Teacher-directed activity. With a small group of students go over the process of changing a percent to a fraction. Review definition of percent and reducing fractions to lowest terms. Provided are 15 problems for practice at the end of this unit. Example: 18% = 18/100 = 9/50	Practice material located at end of unit.		X	X	X		X	
7. During one baseball season the nine regular members of a team made the below record. Find (continued)	9.13	X	X	X	X	X	X	X

<table>
<tr><th rowspan="2">Activities</th><th rowspan="2">Materials</th><th colspan="7">Objectives</th></tr>
<tr><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th><th>7</th></tr>
<tr><td>7. (continued) each boy's correct batting average to the nearest hundredth. (First make a fraction with Hits as the numerator and At Bat as the denominator. Then divide the denominator into the numerator.)
Example: 8/32 = 32)8.00 = .25
64
160
160
<table>
<tr><th>Players</th><th>At Bat</th><th>Hits</th><th>Batting Average</th></tr>
<tr><td>Henry</td><td>32</td><td>8</td><td>.25</td></tr>
<tr><td>John</td><td>28</td><td>14</td><td></td></tr>
<tr><td>Murray</td><td>36</td><td>12</td><td></td></tr>
<tr><td>Sam</td><td>36</td><td>6</td><td></td></tr>
<tr><td>Joe</td><td>30</td><td>10</td><td></td></tr>
<tr><td>Hank</td><td>36</td><td>9</td><td></td></tr>
<tr><td>Harvey</td><td>28</td><td>7</td><td></td></tr>
</table></td><td>9,13</td><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td></tr>
<tr><td>8. Teacher-directed activity. With a group of five students go over how to change a decimal to a percent. (Law. Move the decimal point two places to the right and add a percent sign.)
Example: .6 = 60 = 60% .14 = 14 = 14%
.065 = 06.5 = 6.5%
Twenty problems are provided for practice. These are found at the end of this unit.</td><td>Practice materials located at end of unit.</td><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td><td></td></tr>
<tr><td>9. Go to Station B. Get the coins provided in Box A. Count all the coins and let this number be the denominator. Find numeraters in the following ways: (Be sure to count correctly.)
a) number of dimes and quarters
b) number of pennies
c) number of quarters and half dollars
d) number of nickels and pennies
Now go back and change each fraction you wrote to a percent.</td><td>6</td><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td><td></td></tr>
<tr><td>10. Go to Station C with your group and play the Equivalent Wheel Game. Instructions for game activity are located in the end of this unit.</td><td>7</td><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td></tr>
<tr><td>11. Get a dictionary and define, Write the pronunciation of and use each vocabulary word in Activity 11 in a sentence. Vocabulary words are located at the end of this unit.</td><td>11</td><td>X</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>

<table>
<tr><th rowspan="2">Activities</th><th rowspan="2">Materials</th><th colspan="7">Objectives</th></tr>
<tr><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th><th>7</th></tr>
<tr><td>
<p>12. Get a sheet of paper and copy the table. Show all work when you have filled in the blanks.</p>
<table>
<tr><th>Fraction in lowest terms</th><th>Fraction with denominator of 100</th><th>decimal</th><th>%</th></tr>
<tr><td>1. ½</td><td>1. 50/100</td><td>1. .50</td><td>1. ____</td></tr>
<tr><td>2. ¼</td><td>2. 25/100</td><td>2. ____</td><td>2. ____</td></tr>
<tr><td>3. ________</td><td>3. 75/100</td><td>3. ____</td><td>3. ____</td></tr>
<tr><td>4. ________</td><td>4. ________</td><td>4. .40</td><td>4. ____</td></tr>
<tr><td>5. ________</td><td>5. ________</td><td>5. ____</td><td>60%</td></tr>
<tr><td>6. 1/20</td><td>6. ________</td><td>6. ____</td><td>5%</td></tr>
<tr><td>7. 1/10</td><td>7. ________</td><td>7. ____</td><td>7. ____</td></tr>
</table>
</td><td>Paper & Pencil</td><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td></tr>
<tr><td>
<p>13. <u>Finding Percentages</u></p>
<p>This activity provides experience in comparing salary with amounts saved or spent. When comparing you are to construct the fraction with the total amount as the denominator and the amount spent or saved as the numerator. If the fractions need to be reduced to lowest terms, please do so. Now make the denominator 100 so you can write the answer as a percent.</p>
<p>Example: John earned $340 a month. What percent of his salary did he save if he saved $34.</p>
<p>$\frac{34}{340} = \frac{1}{10}$ (now multiply by 10/10 to make the denominator 100)</p>
<p>1/10 X 10/10 = 10/100 = 10%</p>
<p>10% of John's salary was saved.</p>
<p>Find activity Sheet 13 at the end of this unit and work each problem</p>
</td><td>Paper & Pencil</td><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td></tr>
<tr><td>
<p>14. Library Study</p>
<p>Get a pass from your teacher and go the Library to do research on the origin and the many uses of Percent. Share what you have found with your teacher.</p>
</td><td></td><td>X</td><td>X</td><td>X</td><td>X</td><td></td><td></td><td>X</td></tr>
</table>

Activities	Materials	Objectives						
		1	2	3	4	5	6	7
15. Go to Station D, Get the filmstrip previewer and preview the following tapes. 1. Meaning and Application of percent and Percentages 2. The Mrny Uses of Percents	5	X	X	X	X	X	X	X
16. Whole Group Activity: Speakers Today on Percents a. Speaker from a Bank on Percents b. Speaker from a Department Store on Percent c. Speaker - Housewife on Percents After the speakers have presented their ideas please ask questions if there are any.	(No materials needed)	X	X	X	X	X		X
17. Fold Trip - Today everyone is to visit a bank and a local department store to see the guest speakers in action. Time will be allowed for questions	(No materials needed)	X	X	X	X	X		X
18. Sale Price Fun Find the Sale Price of Aricles bought at the following discounts. Example: $12 pair of shoes at a 20% discount (First find the discount) (Second find the sale price) $12 X .20 = 2.40 12.00 original Price - 2.40 discount = 9.60 sale Price Activity sheet for Activity 18 will be found at the back of this unit.	Paper & pencil Practice material located at the end of unit.	X	X	X	X	X	X	X
19. Read the Horoscope on the following page and answer the following quesitons: a. Look at the dates and show what percent of the dates are odd numbers. b. What percent of the dates are even numbers. c. What percent of the signs such as Aries start with a vowel? d. What percent of the signs start with consonants?	9,4,13	X	X	X	X	X	X	

Activities	Materials	Objectives						
		1	2	3	4	5	6	7
19 Continued  **Your Horoscope For Tomorrow** **For Thursday, July 4, 1974** **ARIES (March 21-April 19)** This will turn out to be a fun day for you if you abide by the majority rule. Don't insist upon having your way. **TAURUS (April 20-May 20)** Travel could have its frustrations for you. Why not plan something where you have the gang come to YOU? **GEMINI (May 21-June 20)** Forget about trying to mix business and pleasure — they just won't gell. Set your sights on relaxing. Let yourself go. **CANCER (June 21-July 22)** Base your decisions on the more tolerant aspects of your nature. Be prepared to compromise and yield a little **LEO (July 23-Aug. 22)** You will be called upon to lend a helping hand to a friend. Although it will cause you some inconvenience, do it with a smile. **VIRGO (Aug. 23-Sept. 22)** Have a good time, but don't let out all the stops. This is one of those days when moderation and self-discipline are needed. **LIBRA (Sept. 23-Oct. 23)** In the earlier part of your day you'll have some aggravation to contend with. Toward evening, the picture changes. **SCORPIO (Oct. 24-Nov. 22)** In your social activities something of a positive nature will occur. It will considerably enhance your self-image. **SAGITTARIUS (Nov. 23-Dec. 21)** In any situation that requires you to spend or commit yourself in some manner, be sure you know who you're doing business with. **CAPRICORN (Dec. 22-Jan. 19)** You could be rather harsh on someone you're quite fond of if you don't make allowances for their shortcomings. **AQUARIUS (Jan. 20-Feb. 19)** You're going to be pleasantly surprised when one you think has been taking advantage of you comes through in a big way. **PISCES (Feb. 20-March 20)** Be selective if you have a choice regarding your social activities. Don't go to the affair where the loudmouth is.								
Go to Station E. Get the two coins and toss them 50 times. Make fractions with 50 as the denominator and the following as the numerator: a. The number of times 2 tails showed up. (TT = tails on both coins) b. The number of times Head-Tails showed up. c. The number of times 2 Heads showed up.	6	X	X	X	X	X	X	

Activities	Materials	Objectives 1	2	3	4	5	6	7
20. Continued d. Now go back and make a,b, & c percents. e. Have this checked first, then toss the coins 25 times, 100 times, and 20 times. Use the same procedure as you did for 50 tosses in constructing new percents.								
21. Go to Station H. Get the two dice from the station and the paper needed to record results. a. You are to toss the dice 36 times and record the numbers that show up as an ordered pair, such as (4,3). b. Before you try to work the problem check activity sheet 21 located at the end of this unit for all possible numbers that show up. c. Now you are to answer the following questions. 1. What is the chance of a sum of 7 showing up. Example: (2,5) (1,6) (3,4) (5,2) (6,1) and (4,3) Some numbers are changed around because there are two different dice. 2. 6/36 = $36\overline{)6.00}$ = .16 24/36 36 240 216 24 = 16 2/3% 3. Work Activity Sheet 21 found at the end of this unit.	6	X	X	X	X	X	X	
22. Go to Station K, Play monolopy with the other three students assigned to the station. At the end of the time limit do this: 1. Count all the bills you have. 2. Count all the $1 bills you have. 3. Count all the $5 bills you have. 4. Count all the $10 bills you have. 5. Count all the $50 bills you have. 6. Count all the $100 bills you have. 7. Count all the $500 bills you have.	10	X	X	X	X	X	X	X

Activities	Materials	Objectives						
		1	2	3	4	5	6	7
22. Continued Now let 1 be the denominator and 2 through 7 be the numerators. a. Make the 6 fractions. b. Now change the fractions to percents. You are to show what percent of your total money are one-dollar bills; five dollar bills, etc.								
23. Squares of 100 Station N Materials Needed Each student will need a sheet of ¼" graph paper, colored pencils, scissors, and a large sheet of construction paper. Directions On a sheet of graph paper, count ten squares down and ten squares across. Mark around this large square with your pencil, and cut the square out. This square contains ______ small squares. Color 22 squares red? What part of the whole did you color? 22/100 or 22% * You are now to follow the same directions and show the following sections: 6% 33% 42% 98% 19% 8% 28% 75% 100%	1,4,13	X	X	X	X	X	X	X
24. Get a newspaper and look over the section where sales are given. Now I want you to get a sheet of Construction paper and make an article that you would like put in the paper. (Be sure to include the name of the article you are selling, at what percent, and a picture of the article if you can draw one.)	9,13	X	X	X	X	X	X	X
25. Look around in your classroom at your classmates. Now answer the following questions concerning your classmates. a. What percent of your classmates have blond hair? b. What percent of you classmates have black hair?								

Activities	Materials	Objectives 1	2	3	4	5	6	7
25. Continued c. What percent of your classmates are girls? (young ladies!) d. What percent of your classmates are young men?								

ACTIVITY 5

Change each of the following fractions into a percent.

1. 1/10
2. 1/5
3. 3/10
4. 2/5
5. 1/2
6. 7/10
7. 1/4
8. 4/5
9. 9/10
10. 3/20
11. 9/25
12. 6/12
13. 8/20
14. 17/20
15. 13/25

[illegible]6. 5/8

17. 9/12
18. 18/50
19. 16/20
20. 9/50
21. 1/8
22. 3/4
23. 2/4
24. 11/25
25. 2/8
26. 6/5

ACTIVITY 6

Change each of the following percent into a fraction in lowest terms.

1. 1%
2. 2%
3. 4%
4. 12%
5. 15%
6. 18%
7. 25%
8. 29%
9. 40%
10. 35%
11. 48%
12. 60%
13. 75%
14. 95%
15. 100%

ACTIVITY 6B

1. We have already seen that

   $1/6 = 16\ 2/3 \div 100$

   $3/7 = 42\ 6/7 \div 100$

   $2/3 = 66\ 2/3 \div 100$

   Hence we can write

   1/6 = __________%

   3/7 = __________%

   2/3 = __________%

   16 2/3; 42 6/7; 66 2/3

2. Of course you are familiar with the symbol %, which is read "PERCENT." The symbol, %, means "÷ ____________."

   100

3. Then 40% means $\underline{\qquad\qquad} \div 100 = \frac{\underline{\qquad}}{100} = \frac{\underline{\quad}}{5}$

   40; 40; 2

4. And

   $75\% = \frac{\underline{\qquad}}{100} = \underline{\qquad\qquad}$

   75; 3/4

5. Change each "percent" to a fraction in simplest form.

   10% = 10/100 = 1/10

   30% = ______________

   60% = ______________

   66 2/3% = ______________

   3/10; 3/5; 2/3

ACTIVITY 6B
Continued

6. Also

125% = 125/100 = 5/4

150% = ______________

3/2

7. Change each "percent" to a fraction or a natural number in simplest form.

12 1/2% = ______________

160% = ______________

100% = ______________

500% = ______________

1% = ______________

1/8; 8/5; 1; 5; 1/100

8. We have shown that

$$5/8 = \frac{62\ 1/2}{100} = 62\ 1/2\%$$

Then to change a fraction to a "percent" we may first change the fraction to an equal one whose denominator is __________

100

9. Carry out the steps necessary to change the fraction to a "percent."

1/3 = ___________%

$$1/3 = \frac{1 \times \frac{100}{3}}{3 \times \frac{100}{3}} = \frac{100/3}{100} = \frac{33\ 1/3}{100} = 33\ 1/3\%$$

ACTIVITY 8

Change each of the following decimals into a percent.

1. .85
2. .60
3. .08
4. .04
5. .6
6. .70
7. .62
8. .45
9. .084
10. .50
11. .32
12. .24
13. .90
14. .09
15. .33
16. .18
17. .2
18. .06
19. .49
20. .006

ACTIVITY 8B

A Review

Fill the blanks.

1. .005 = ____________________%
2. .003 = ____________________%
3. .0005 = ____________________%
4. .5%= ____________________
5. .05%= ____________________
6. 2.3%= ____________________
7. .023%= ____________________
8. .15% = ____________________
9. .0025 = ____________________%
10. .25% = ____________________
11. .033% = ____________________
12. .0025% = ____________________
13. .25 = ____________________%
14. .0075 = ____________________%

ACTIVITY 10

How to Make an Equivalents Wheel

Aim The purpose of the Equivalents Wheel is to provide immediate recall of fractional form, percent form or decimal form of numbers as they relate to percents.

Instructions for making the Equivalents Wheel

Cut a tagboard circle at least 12" in diameter. Around the edge write a variety of percents. To the center of the circle attach a tagboard spinner with a paper fastener, making sure the hand can spin freely.

Instructions for Playing

Divide the group into two teams. The first person from Team A comes up to the wheel and spins the hand. When the hand stops, he will look at the number to which the hand points or is closest to it. The person will do three things:

1) Tell the percent form itself
2) The common fraction equivalent
3) The decimal fraction equivalent

If he answers all three correctly, he wins a point for his team. The the first person from Team B may use the wheel. At the end of the playing time, the team with the Highest Score wins.

Variations: The wheel can also have (a) the decimal form or (b) the fractional form.

ACTIVITY 11

VOCABULARY WORDS

Define, use in a sentence, and write the pronunciation of each word below.

1. equivalent
2. fraction
3. percent
4. decimal
5. denominator
6. numerator
7. percentage
8. ratio
9. commission
10. interest

ACTIVITY 13

FIND THE PERCENT

Find the following percentages.

1. James made $36 on Monday and spent $9. What percent of his salary did he spend?

2. A man earns $800 a month. What percent of his salary does he save, if he saves $80?

3. Jim spends $24 of his $960 a month on life insurance. What percent of his salary does he spend on insurance?

4. In a class of 40 pupils, 10 were not promoted. What percent of the pupils were not promoted? (Remember to make a fraction!)

ACTIVITY 18

SALE PRICE FUN

Find the amount of discount and the sale price of the following articles.

1) $45 overcoat at a 25% discount

2) $8 sweater at a 40% discount

3) $12 shirt at a 25% discount

4) $13 belt at a 10% discount

5) $50 tape deck at a 20% discount

6) $45 radio at a 40% discount

7) $3.50 album at a 30% discount

ACTIVITY 21

CHART OF ALL POSSIBLE SUMS FOR ACTIVITY 21.

	1	2	3	4	5	6
1	(1,1)	(1,2)	(1,3)	(1,4)	(1,5)	(1,6)
2	(2,1)	(2,2)	(2,3)	(2,4)	(2,5)	(2,6)
3	(3,1)	(3,2)	(3,3)	(3,4)	(3,5)	(3,6)
4	(4,1)	(4,2)	(4,3)	(4,4)	(4,5)	(4,6)
5	(5,1)	(5,2)	(5,3)	(5,4)	(5,5)	(5,6)
6	(6,1)	(6,2)	(6,3)	(6,4)	(6,5)	(6,6)

What is the percent that each of the following sumes will be?

a. 11

b. 12

c. 4

d. 6

e. 5

f. 10

g. 8

ACTIVITY 26

Unscramble the following words that pertain to percent.

1. REP NTCE ___ ___ ___   ___ ___ ___ ___

2. IATOR ___ ___ ___ ___ ___

3. MUNTERAOR ___ ___ ___ ___ ___ ___ ___ ___ ___

4. VALQUIVLTEN ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___

5. CIMDALE ___ ___ ___ ___ ___ ___   ___

6. TARNFCOI ___ ___ ___ ___ ___ ___ ___ ___

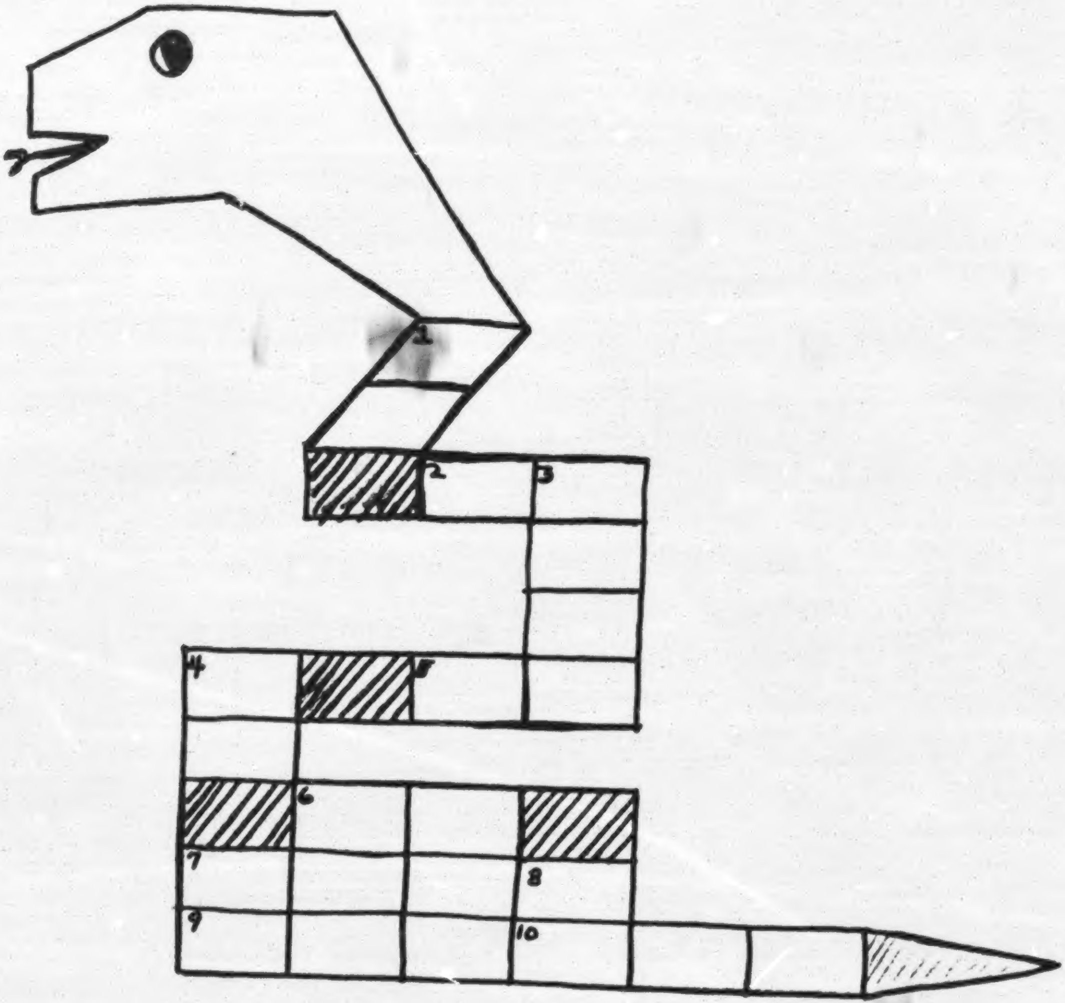
7. MONETIDRATION ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___

8. MOCIIMNOSS ___ ___ ___ ___ ___ ___ ___ ___ ___ ___

9. TINTREES ___ ___ ___ ___ ___ ___ ___ ___

The exercises on the following pages are provided for students who exhibit a need for extra practice.

BASIC PER CENT PROBLEMS



Across

2. 11% of 300
5. .4% of 5000
6. 37 1/2% of 88
7. 2/3% of 3600
9. 40% of 125
10. 96% of 900

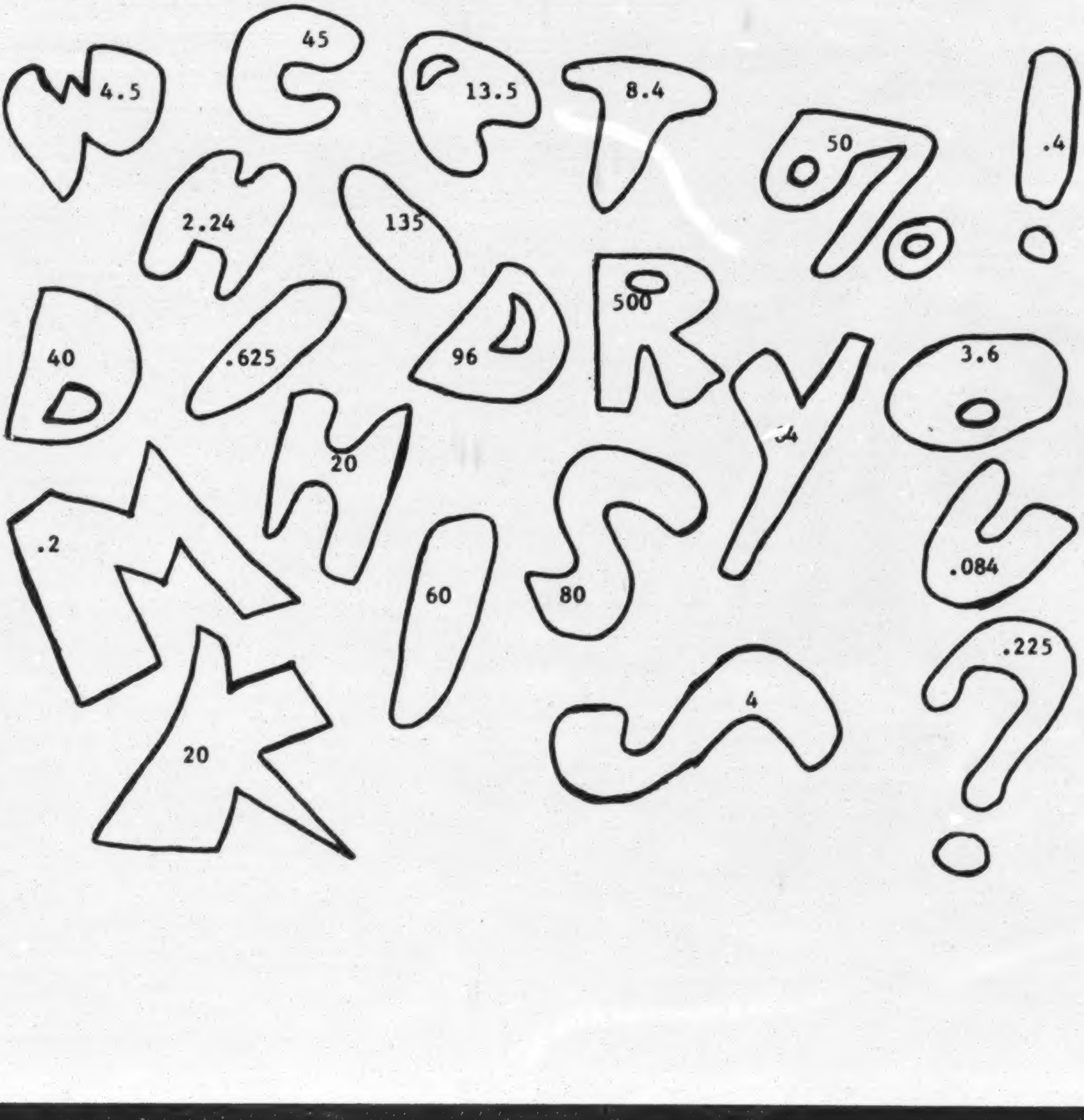
Down

1. 8% of 300
3. 23% of 14,000
4. 125% of 60
6. 1% of 34,000
7. 5% of 500
8. 140% of 70

A PER CENT CODE

Solve the following problems and locate the answers below. Shade in the letters that contain the answers. If your work is correct, a message will appear.

1. 30% of 15
2. 4% of 56
3. 15% of 90
4. 100% of 8.4
5. 125% of 40
6. 33 1/3% of 120
7. 2.5% of 25
8. 8% of 1200
9. 80% of 80
10. 2 1/4% of 160
11. 1% of 8.4
12. 1/3% of 60
13. 66 2/3% of 90
14. 10% of 800
15. 1/2% of 800
16. .9% of 25


45
4.5
13.5
8.4
50
.4
2.24
135
500
40
.625
96
3.6
64
20
.2
.084
60
80
.225
4
20

THE MEANING OF PER CENT

1. Recall that a ratio is a comparison of two numbers by
____________________________. (An arithmetic operation.) (division)

2. We have seen that the ratio of hits to number of times at
bat for Malzone was 169/604. The ratio for Francona was 145/399.
We cannot directly compare their performances, so we change the
fractions to thousandths. Since 169/604 = .280, while 145/399 - .363,
we can see that Francona's average was better than Malzone's.
Another commonly used method of comparing fractions is to
change them to hundredths. If John scored 17 foul shots with a
basketball, out of 25 attempts, the ratio of shots made by John
to the number of attempts is ______________. (17/25)

3. Paul scored 14 baskets out of 20 attempts. His ratio of
baskets scored to attempts is ____________________. (14/20)

4. Change both of these fractions to hundredths and compare (17/25 = 68/100)
them. Which has the better performance? (The boy with the
largest ratio will have the better performance.) (14/20 = 70/100)
__________________________.

17/25 = ?/100 John's ratio

14/20 = ?/100 Paul's ratio

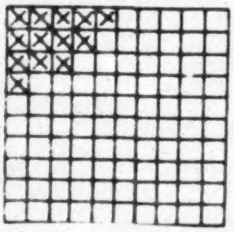
(We conclude that
Paul's performance
was better, since
70/100 is larger than
68/100)

5. 5 out of 10 gives the same score as ________________ (5/10 - 50/100
out of 100. the answer is 50.)

6. 7 out of 25 is the same score as ________________out
of 100. (7/25 = 28/100
The answer is 28.)

7. Is 1 out of 4 better than 3 out of 10? (Change both
fractions to hundredths and compare them.)______________. (1/4 = 25/100 No, 3
out of 10 is 3/10
=30/100 of 4.)

8. This square is divided into 100 equal parts. Therefore,
1 part is one one hundredth of the whole. Since each part is 1
out of 100 parts, we say that each part is 1 per cent of the total.
This is derived from the Latin work centum; meaning hundred.
Thus, 1 per cent means 1 out of each __________________. (hundred)



9. The shaded area in the square of the previous frame represents ____________________per cent of the square. (13)

10. The unshaded area of the figure in the previous frame represents _____________________ per cent of the square. (87 since 87 of the hundred parts are unshaded.)

11. Three of the equal parts would represent three out of a hundred, or __________________per cent. (3)

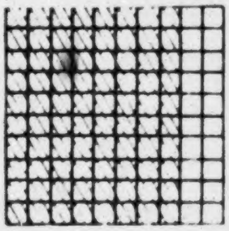
12. Seven of the equa' parts would represent 7 out of a hundred, or _____ _____________per cent. (7)

13. Twelve of the equal parts would represent 12 out of a hundred, or 12 ______________________. (per cent)

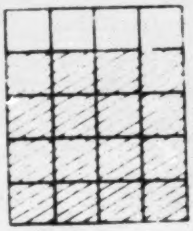
14. Ninteen of the equal parts would represent ____________________per cent of the total. (19)

15. Forty-seven of the equal parts would represent 47__________________________. (per cent)

16. Jack obtained 16 correct answers out of 20 questions on a test. He drew a square similar to that below, and divided it into 20 equal parts. He then shaded 16 of the parts. Next, he divided another square of the same size into 100 equal parts. Shading in an area the same size as the first square, he found that 16 out of 20 is the same as 80 out of 100, or 80 hundredths. He therefore stated that 16 out of 20 is _________________ per cent. (80)



17. 16/20 of the area below is shaded. This is 80/100 or 80 per cent of the total area; 4/20 of the area is not shaded. What per cent of the total area is not shaded? _____________. (4/20 = 20/100 for 20 per cent)



18. One out of 2 (written 1/2) is the same as __________ out of 100 (written ?/100). (50)

19. 1/2 = 50/100 = 50% (The symbol for per cent is %.) Write the decimal .50 as a common fraction having a denominator of 100.__________. (.50 = 50/100)

20. 1/2 = .50 = 50 out of 100 or 50 __________. (per cent for %)

21. 1 out of 4 is the same as __________ out of 100. (25)

22. 1 out of 4 is the same as 25 out of 100. Hence, 1/4 = 25 out of 100, or 25 __________. (per cent or %)

23. 3 out of 4 is the same as __________out of 100. (75)

24. 3 out of 4 is the same as 75 out of 100. Hence, 3/4 = 75 out of 100, or __________per cent. (75)

25. Per cent means the same thing as hundredths. Therefore, any decimal may be expressed as a per cent. Thus .75 means 75 hundredths, or 75% and .29 means 29 hundredths or __________%. (29)

26. .15 means 15 hundredths or __________%. (15)

27. .47 means 47 hundredths or 47 __________. (% for per cent)

28. __________ means 12 hundredths or 12%. (.12)

29. .33 1/3 means 33 1/3 hundredths or __________%. (33 1/3)

30. .84 1/2 means 84 1/2 __________, or 84 1/2%. (hundredths)

31. 1.00 means 100 hundredths, or __________%. (100)